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PART I.

Original Contributions.

SUMMARY OF 192 CASES OF ASTIGMATISM.

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A SUMMARY of 192 cases of astigmatism occurring, mostly during the past two years, in my hospital and in private practice, will, I venture to think, prove not altogether un-instructive. I must, *in limine*, beg the reader's indulgence for the incompleteness of my notes; it will be accorded, I am confident, by all who personally know the pressure of having, unassisted, to prescribe for many patients within limited hours—my lot during a great part of this time. The data in the tables are, I believe, as exact as clinical work permits, and are close approximations to truth, but I may not claim for them that rigorous exactness which is expected of experiments conducted at leisure in the physiological laboratory.

Without undervaluing other means of diagnosis, I refer particularly to various forms of optometer, each of which has its advantages, I have a decided preference for Snellen's half-circle of radiating lines and + and — spherical glasses. As regards the ophthalmoscope, the presence of even a slight

degree of astigmatism will seldom, I think, escape the recognition of a fairly practised observer, but the directions of the principal meridians are only very roughly determinable with it, and I find that a sufficiently close measure of their respective M or H is only attainable with it by an inconvenient expenditure of time. With a fan of radiating lines separated by angles of 10° , and + and - s. glasses, not only the presence of astigmatism, but the directions of the principal meridians and their refraction are, in general, promptly and very closely ascertainable. For those whose sight is very blunt, I use a larger fan than Snellen's, with stouter lines, and where, as occasionally happens, a patient is bewildered by an unconscious shifting of his accommodation, and he says at one moment that this line is the sharpest and at another moment another line becomes so, and I find that he cannot form a consistent judgment, I replace the fan by a single pointer bearing three black lines separated by equal white intervals, revolving, like the hand of a clock, across a white sheet on which a graduated circle is so faintly traced as to appear to the patient to be blank. It is seldom that any difficulty is experienced in deciding in which position the striped pointer appears clearest and where it is least clear. A series of black and white striped circular discs, such as those in Burchardt's Internationale Sehproben, but larger, is a very useful control test. Their uniform figure makes them a fairer object than the similarly striped letters of Orestes Pray. Cylindric glasses I have used only as a final control and for correction. It is convenient to record cases in a uniform manner, and I have found that a sort of graphic notation lessens the perplexities of the subject for students and for medical practitioners who are not familiar with eye-disease. An illustration by an actual case will best explain the plan I usually follow.

Case.—Oc. d. AM $\frac{1}{24}$ || Oc. S. M $\frac{1}{9}$ + Am $\frac{1}{36}$.

A young naval officer, æt. 20, consulted me in October,

1873, saying that from childhood he had been aware that he saw less distinctly than some other persons, but that which seriously distressed him was the difficulty he found in recognising signal-flags, especially those composed of crossed bands.

With the right eye I found that he could read No. 1 of Snellen's type at 8 inches distance, but he hesitated at No. 50 on Snellen's test-sheet 16 feet off. With the left eye he read No. 1 at 9 inches, but could not distinguish CC (No. 200) at 16 feet. — s. glasses scarcely assisted the right eye, but — $\frac{1}{9}$ s. gave the left eye V. nearly $\frac{2}{30}$, this eye had then M of $\frac{1}{9}$. Placed before Snellen's fan at 20 feet (with head erect, face square to the test-sheet, eyes widely open, and the test-sheet in the level of his eye), with the right eye he saw the vertical rays sharply, the inclined rays dimly, and the horizontal rays were scarcely visible. The horizontal meridian of his cornea was therefore emmetropic. A weak + s. glass dimmed the inclined rays yet more, but a — s. glass cleared them, — $\frac{1}{24}$ s. making the horizontal ray as black and sharp as the vertical ray had appeared without the glass. The vertical meridian of the cornea was therefore M $\frac{1}{24}$. To the left eye, armed with — $\frac{1}{9}$ s., ray 160° * was black and sharp, the 70° corneal meridian was therefore M $\frac{1}{9}$. 70° ray, previously pale and dim, was brought out quite sharply by — $\frac{1}{36}$, superposed 160° corneal meridian was therefore

$$M \left(\frac{1}{9} + \frac{1}{36} \right) = \frac{5}{36} = \frac{1}{7\frac{1}{5}}.$$

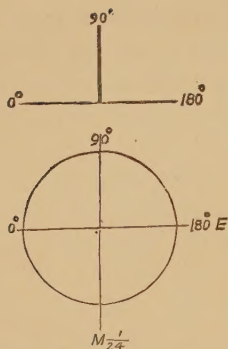
Stated shortly, the case runs as below :—

——— æt. 20, Naval Officer.

Oc. d. reads No. 1 Snellen, at 8"; stumbles over No. 50 Snellen at 16'. Weak + s. glasses confuse and — s. scarcely help.

90° in fan sharp. 0° — 180° very scarcely visible.

* I graduate the half circle from 0° to 180° , counted from left to right.



$\therefore$ Astigmatism, and
 $\therefore$ C.M. $0^\circ-180^\circ$ is E.
 + s. dims yet more $0^\circ-180^\circ$ ray,
 but - s. clears it, and $-\frac{1}{24}$ s. most.
 $\therefore$ C.M. 90° is M $\frac{1}{24}$.
 With $-\frac{1}{24}$ c. axis in C.M.*
 $0^\circ-180^\circ$, all rays uniformly clear,
 and V. almost $\frac{2}{0}$.

Oc. s. reads No. 1, at $9''$, but only No. 200 at $16'$, and not at $20'$.

$-\frac{1}{9}$ s. best, V. almost $\frac{2}{0}$.

$\therefore$ M $\frac{1}{9}$.

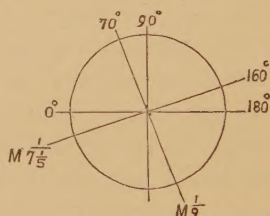
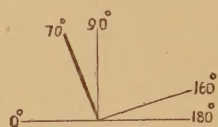
With $-\frac{1}{9}$ s. 160° ray in fan sharp.

$\therefore$ C.M. 70° M $\frac{1}{9}$.

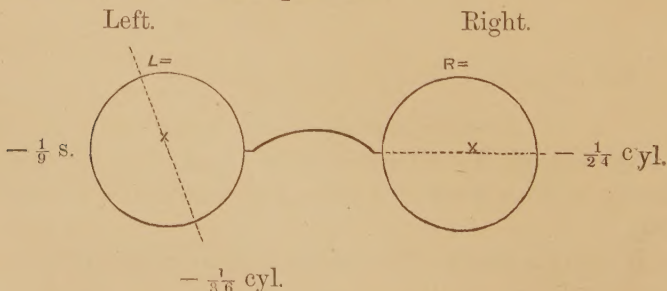
$-\frac{1}{9}$ s. $\ominus$ $-\frac{1}{36}$ s. clears 70° ray.

$\therefore$ C.M. 160° is M $(\frac{1}{9} + \frac{1}{36})$.

$$= \frac{5}{36} = \frac{1}{7\frac{1}{2}}$$



($-\frac{1}{9}$ s. $\ominus$ $\frac{1}{36}$ c. axis in C.M. 70°) clears whole fan and V. $-\frac{2}{0}$ nearly. Ordered spectacles.



* C.M.—Corneal meridian.

These gave much satisfaction, and removed what had threatened to be a serious disability. I was agreeably surprised to find that, contrary to that which frequently obtains where the refraction of the two eyes so greatly differs, when their ametropia was neutralized he saw better with both eyes than with either alone.

Of late years one thing has increasingly impressed itself on me—the frequency of astigmatism in degrees sufficiently great to appreciably diminish the acuteness of sight. I had formerly thought this to be relatively rare. I refer to regular astigmatism. With respect to sexual proclivity I find, so far as my numbers reach, that males and females occur in nearly equal proportions, the former slightly preponderating. Donders, in his incomparable treatise on “The Anomalies of Accommodation and Refraction,” has remarked the preponderance of astigmatism in males. As regards the social status of astigmatics, I find that my private patients, who represent a higher social position, are to my hospital cases, as 119 : 73.

With a very few exceptions, my tables contain only examples of congenital origin. I hope, at a future time, to contribute a summary of cases of acquired astigmatism, including that which follows extraction and, in some cases, reaches $\frac{1}{7}$ or even $\frac{1}{4}$.

Of all the forms of regular astigmatism compound myopic M. + Am. greatly preponderates. It constitutes 44·271 per cent. of all the cases included in this series. Next in frequency is the compound hypermetropic, H. + Ah. 26·562 per cent. Simple myopic Am. makes 13·002 per cent.; simple hypermetropic Ah. 9·375 per cent., and mixed astigmatism Ah. + Am. and Am. + Ah. only 6·718 per cent. In half the cases tabulated below, one eye only had an abnormal amount of astigmatism. In many of these, however, the other eye was simply myopic or hypermetropic. In several instances more than one member of a family was astigmatic, generally under the same or a similar form. The subjoined Table explains itself.

I.—*Table of Different Forms of Astigmatism.*

	No. of persons.	No. of eyes.	One eye astigm.	Both eyes astigm.	Males.	Females.	Sex not recorded.	Hospital.	Private.
Ah.....	18	34	2	16	8	10	1	2	16
H + Ah	51	84	18	33	28	23	..	26	25
Am	25	42	8	17	18	7	..	8	17
M + Am.....	85	139	31	54	39	42	3	27	58
Am + Ah	13	21	5	8	5	8	..	10	3
Ah + Am									
Am									
+ Ah									
	192	320	64	128	98	90	4	73	119

In the following table (II) the quantities under Ah were determined, after the ciliary muscle had been paralysed, with a solution of sulphate of atropine (gr. iv. ad ʒi.), dropped into the eye three times. In many cases Ahm. only was determined. This frequently arose from patients being unable or unwilling to submit, for a few days, to the inconvenience entailed by suspension of accommodation. Some were clerks and others seamstresses, who would have forfeited their situations by absence from work. In most cases, however, the complete correction of the Ahm. sufficed to greatly improve V., and to remove the asthenopia. Under "Remarks," s. means that the glass is spherical, c. that it is cylindrical. Upon a comparison of this with the table of AM, it will be seen that high degrees of Ast. are more frequent in Ah.

II.—Table of Cases of *Ah*. (Simple Hypermetropic Astigmatism).

Direction of Principal Meridians.										Remarks.					
Maximum of Curvature.						Minimum of Curvature.									
No.	Sex.	Age.	Eye.	Ab.	Ahm.	P.	* Vt.	† App. Vt.	‡ App. Hz.		§ App. Hz.	Vt.	App. Vt.	App. Hz.	App. Hz.
1	f.	16?		$\frac{9}{16}$	..	..	130°	..	×	..	40°	..	×	×	Strab. conv. conom. cong. Dev. = $3\frac{1}{2}''$.
2	f.	54	rt. left	..	$\frac{1}{2}$ $\frac{9}{16}$	×	90° 90°	×	×	..	0°-180° 0°-180°	..	×	×	"I cannot draw: when I think I am making a perpendicular line, it slants." (+ $\frac{1}{20}$ c.) gave V. = $\frac{2}{5}$ c. She had these for general use; and for reading (+ $\frac{1}{15}$ c.) V. left and right $\frac{1}{10}$ c. With (+ $\frac{1}{10}$ c.) V. nearly $\frac{2}{5}$ c. "I can't distinguish fractions." + $\frac{1}{10}$ c. gave V. = $\frac{2}{5}$ c. and with these he read 1 Snellen at 12" correctly and without fatigue.
3	f.	11	rt. left	..	$\frac{1}{10}$ $\frac{9}{16}$	..	75° 115°	..	×	×	165° 25°	..	×	×	Great asthenopia. + $\frac{1}{20}$ c. gave V. = $\frac{2}{5}$ c. and with these he read without strain.
4	m.	14	rt. left	..	$\frac{1}{10}$ $\frac{9}{16}$	..	100° 80°	..	×	×	10° 170°	..	×	×	Right eye M. $\frac{1}{5}$.
5	m.	20	rt. left	$\frac{1}{20}$ $\frac{1}{20}$	..	..	75° 110°	..	×	×	165° 20°	..	×	×	
6	f.	15	left	$\frac{1}{20}$	..	..	90°	×	..	..	0°-180°	..	×	×	

* Vt.—Vertical.

† App. Vt.—Approximately vertical.

‡ Hz.—Horizontal.

III.—Table of Cases of $H + Ah$.

Direction of Principal Meridians.										Remarks.
Maximum of Curvature.					Minimum of Curvature.					
	Vt.	App. Vt.	H _{z.}	App. H _{z.}		Vt.	App. Vt.	H _{z.}	App. H _{z.}	
1	0°-180°	..	..	..	90°	×	×	..	..	Thought short-sighted by school-master, because he held his book very close and looked sideways at it. Asthenopic and amblyopic. Spectacles of ($+\frac{1}{6}$ s. $\bigcirc + \frac{1}{10}$ c.) relieved his fatigue, removed his spurious short-sightedness, and made $V. = \frac{2}{3}\phi$. “As a schoolboy I always had trouble over my lessons. I hold my head sideways, and screw my eyelids,” Lately much mental anxiety, since which sight worse. Using, by the advice of a Continental oculist of much reputation, + s. glasses, decentred, right $+\frac{1}{12}$, left $+\frac{1}{6}$, outdoors; and right $+\frac{1}{3}$ s., left $+\frac{1}{4}$ for reading. As these neither relieved wholly the strain nor perfectly cleared print, he con-
	0°-180°	..	..	×	90°	×	×	..	..	
2	70°	..	×	..	160°	..	×	..	×	
	20°	..	..	..	110°	..	×	..	×	
No.	Sex.	Age.	Eye.	H.	Ab.	Hm.	Ahm.	P.		
1	m.	11	rt. left	$\frac{4}{9}$ $\frac{9}{10}$	$\frac{3}{4}$ $\frac{4}{7}$	..	..	..	..	
2	m.	41	rt. left	..	..	$\frac{1}{12}$ $\frac{1}{10}$	$\frac{1}{2}$ $\frac{1}{3}$	..	..	

sulted a provincial oculist, who advised him to wear a patch and exclude the left eye in reading, as he considered it almost useless, and it "bothered" the right eye. I ordered right ($+ \frac{1}{12}$ s. $\ominus + \frac{3}{4}$ c.), left ($+ \frac{1}{16}$ s. $\ominus + \frac{1}{16}$ c.), which gave with each singly and together $V. = \frac{2}{3}$, to be worn constantly; and for reading, right ($+ \frac{1}{16}$ s. $\ominus + \frac{1}{16}$ c.), left ($+ \frac{1}{8}$ s. $\ominus + \frac{3}{16}$ c.). With these he read the newspaper, and small foot-notes = "pearl" type, correctly and with comfort.

In reading screws eyelids, and likes a bright light. Has worn + glasses four years, but none suit her. Ordered for outdoors and general use (+ $\frac{1}{20}$ s. $\bigcirc$ + $\frac{1}{40}$ c.), and for reading (+ $\frac{1}{16}$ s. $\bigcirc$ + $\frac{1}{40}$ c.), which suited her.

Without glasses $V. = \frac{20}{30}$. With (+ $\frac{1}{2}$ s. $\ominus$ + $\frac{1}{30}$ c.) for right, and (+ $\frac{1}{20}$ s. $\ominus$ + $\frac{1}{40}$ c.) for left eye, each singly and both together $V. = \frac{20}{30}$. Delicate. Health broken by long residence in a tropical climate. At 15 an oculist prescribed with spectacles. Asthenopic. With right + $\frac{1}{20}$ s., and left + $\frac{1}{18}$ s. $\ominus$ + $\frac{1}{30}$ c., read comfortably.

[illegible]

III.—Table of Cases of *H* + *Ah*—continued.

Direction of Principal Meridians.										Remarks.
Maximum of Curvature.						Minimum of Curvature.				
No.	Sex.	Age.	Eye.	H.	Ah.	Hm.	Alm.	P.		

39	m.	39	rt.	..	..	..	50°	×	..	..	140°	..	×	×	In one simple Ah., in other H + ah. Right, without glass V. = $\frac{20}{200}$; with + $\frac{1}{18}$ s. V. = $\frac{20}{200}$; with (+ $\frac{1}{18}$ s. $\odot$ + $\frac{1}{36}$ c.) V. = $\frac{20}{200}$.
40	f.	16	rt.	..	..	..	140°	..	×	..	50°	..	×	×	Very asthenopic. Sailor. "I often think that I see red and green lights at sea when there are none."
41	m.	14	rt.	$\frac{1}{33}$	$\frac{1}{45}$	..	150°	..	×	..	60°	..	..	..	Without glasses V. = $\frac{20}{100}$; with (+ $\frac{1}{33}$ s. $\odot$ + $\frac{1}{40}$ c.) V. = $\frac{20}{200}$.
42	m.	15	..	$\frac{1}{45}$	$\frac{1}{20}$	..	90°	×	..	..	0°-180°	..	×	..	Right without glass V. = $\frac{20}{200}$, but with (+ $\frac{1}{20}$ s. $\odot$ + $\frac{1}{40}$ c.) $\frac{20}{200}$. Left $\frac{20}{70}$, which rose to almost $\frac{20}{200}$.
43	m.	13	rt.	$\frac{1}{20}$	..	..	0°-180°	..	..	..	90°	×	..	..	Without glass V. = $\frac{20}{70}$; with (+ $\frac{1}{20}$ s. $\odot$ + $\frac{1}{32}$ c.) V. = $\frac{20}{200}$.
44	m.	40	rt.	$\frac{1}{70}$	$\frac{1}{70}$	..	90°	×	..	..	0°-180°	..	×	..	Without glass V. = $\frac{20}{200}$; with (+ $\frac{1}{20}$ s. $\odot$ + $\frac{1}{32}$ c.) it rose to $\frac{20}{200}$. (Under atropine V. less than $\frac{20}{200}$.)
45	m.	24	rt.	$\frac{1}{74}$	$\frac{1}{14}$	..	90°	×	..	..	0°-180°	..	×	..	With + $\frac{1}{14}$ s. it rose to $\frac{20}{200}$, and with (+ $\frac{1}{14}$ s. $\odot$ + $\frac{1}{36}$ c.) to $\frac{20}{200}$.
46	f.	28	rt.	..	..	..	0°-180°	..	×	×	90°	×	..	..	Right V. = $\frac{20}{200}$, left V. = $\frac{20}{200}$. With (+ $\frac{1}{20}$ s. $\odot$ + $\frac{1}{24}$ c.), and (+ $\frac{1}{16}$ s. $\odot$ + $\frac{1}{36}$ c.) V. rose to $\frac{20}{200}$.
47	m.	36	rt.	$\frac{1}{20}$	$\frac{1}{36}$	..	80°	..	..	..	170°	..	×	×	Right, without glass V. less than $\frac{20}{200}$; with (+ $\frac{1}{11}$ s. $\odot$ + $\frac{1}{36}$ c.) V. nearly $\frac{20}{200}$.
48	m.	9	left	$\frac{1}{10}$	$\frac{1}{16}$	..	90°	×	..	..	0°-180°	..	×	×	Left V. $\frac{20}{200}$, with (+ $\frac{1}{11}$ s. $\odot$ + $\frac{1}{14}$ c.) $\frac{20}{200}$ sharply, (+ $\frac{1}{11}$ s. $\odot$ + $\frac{1}{36}$ c.) $\frac{20}{200}$.
49	m.	23	rt.	$\frac{1}{11}$	$\frac{1}{8}$	..	50°	..	×	×	100°	..	×	×	Without glass V. = $\frac{20}{100}$. With (+ $\frac{1}{11}$ s. $\odot$ + $\frac{1}{30}$ c.) V. = $\frac{20}{200}$.
50	m.	19	..	$\frac{1}{14}$	$\frac{1}{14}$	..	170°	..	..	..	80°	..	×	×	
				$\frac{1}{30}$	$\frac{1}{30}$	..	50°	..	×	×	140°	..	..	..	
				$\frac{1}{14}$	$\frac{1}{14}$	..	130°	..	..	..	40°	..	..	..	

IV.—Table of Cases of Am. (Simple Myopic Astigmatism)

Directions of Principal Meridians.						Minimum of Curvature.								Remarks.
Maximum of Curvature.						Minimum of Curvature.								
						Vt.	App. Vt.	Hz.	App. Hz.	Vt.	App. Vt.	Hz.	App. Hz.	
1	m.	50	left rt.	$\frac{1}{2}$..	×	90°	×	..	..	0°-180°	..	×	..	With + $\frac{1}{2}$ c. to give M. $\frac{1}{2}$ to horz. merid. of the left eye, and + $\frac{1}{2}$ s. for the right eye, he read with sharpness and comfort.
2	m.	60	rt. left	$\frac{1}{2}$ $\frac{1}{2}$	×	90° 90°	×	..	..	0°-180° 0°-180°	..	×	×	Ordered - $\frac{1}{2}$ c. axis horz., which gave V. = $\frac{2}{3}$, and for reading + $\frac{1}{2}$ c. axis vt., with which he quickly and easily read "Bradshaw."
3	f.	19	rt.	$\frac{1}{2}$	..	0°-180°	..	×	..	90°	×	..	..	Left simply M. $\frac{1}{2}$.
4	f.	51	rt. left	$\frac{1}{2}$ $\frac{1}{2}$	×	0°-180° 0°-180°	..	×	×	..	..	×	×	- $\frac{1}{4}$ c. axis vt., gave V. = $\frac{2}{3}$. For reading she was ordered (+ $\frac{1}{2}$ c. axis horz. $\odot$ + $\frac{1}{2}$ s.), which were very comfortable.
5	f.	50	rt. left	$\frac{1}{2}$ $\frac{1}{2}$	×	0°-180° 0°-180°	..	×	×	90° 90°	×	×	..	- $\frac{1}{4}$ c. gave V. = $\frac{2}{3}$. For reading she had (+ $\frac{1}{2}$ c. axis horz. $\odot$ + $\frac{1}{2}$ s.).
6	m.	19	rt. left	$\frac{1}{2}$ $\frac{1}{2}$	×	90° 90°	×	×	×	0°-180° 0°-180°	..	×	×	
7	m.	..	rt. left	$\frac{1}{2}$..	×	115° ..	×	×	..	25° ..	..	×	×	

8	m.	28	rt.	$\frac{1}{3}\frac{0}{6}$	..	100°	x	..	10°	..	..	..	Insuff. rect. int.
9	m.	40	left	$\frac{1}{3}\frac{0}{6}$	..	115°	x	..	25°	..	..	..	Ordered — $\frac{1}{3}\frac{0}{6}$ c. axis horz. outdoors, with which V. = $\frac{2}{5}\frac{0}{0}$, and for reading + $\frac{1}{5}\frac{0}{0}$ c. axis vt.
10	m.	50	left	$\frac{1}{5}\frac{0}{0}$	x	90°	..	..	0°-180°	..	x	x	
11	m.	19	rt.	$\frac{1}{5}\frac{0}{0}$	x	0°-180°	..	x	90°	x	..	..	
12	m.	20	left	$\frac{1}{4}\frac{0}{0}$	x	90°	..	..	0°-180°	..	x	x	
13	m.	17	rt.	$\frac{1}{3}\frac{0}{6}$	..	70°	x	..	160°	..	..	..	
14	m.	30	left	$\frac{1}{3}\frac{0}{6}$	..	110°	x	..	20°	x	..	..	
15	m.	35	..	$\frac{1}{2}\frac{8}{8}$	..	0°-180°	..	x	90°	x	..	..	
16	m.	47	..	$\frac{1}{3}\frac{0}{6}$	..	0°-180°	..	..	90°	x	x	x	
17	m.	56	rt.	$\frac{1}{3}\frac{0}{6}$	x	90°	..	..	0°-180°	..	..	..	
18	f.	9	left	$\frac{1}{4}\frac{0}{0}$	x	0°-180°	..	x	90°	..	..	..	
19	m.	35	left	$\frac{2}{5}\frac{8}{8}$	..	140°	..	..	50°	..	x	..	Artist. With — $\frac{1}{3}\frac{0}{6}$ c. V. $\frac{2}{5}\frac{0}{0}$. These were of the greatest service. He had never before seen so well.
20	f.	48	rt.	$\frac{1}{3}\frac{0}{6}$	..	50°	x	..	140°	..	..	..	V. $\frac{2}{5}\frac{0}{0}$ without glasses. With — $\frac{1}{13}\frac{0}{0}$ c. and — $\frac{1}{2}\frac{0}{0}$ c. V. of each almost $\frac{2}{5}\frac{0}{0}$.
21	f.	10	left	$\frac{1}{2}\frac{0}{0}$	..	130°	x	..	40°	..	..	x	Without glasses V. = $\frac{2}{5}\frac{0}{0}$; with — $\frac{1}{3}\frac{0}{6}$ V. = $\frac{2}{5}\frac{0}{0}$. Corneal nebulae.
22	m.	..	rt.	$\frac{1}{3}\frac{0}{6}$	..	90°	..	x	0°-180°	x	..	x	Without glasses V. = $\frac{2}{5}\frac{0}{0}$; with — $\frac{1}{4}\frac{0}{0}$ rt. V. = $\frac{2}{5}\frac{0}{0}$; left V. = $\frac{2}{5}\frac{0}{0}$.
23	m.	35	left	$\frac{1}{4}\frac{0}{0}$	x	90°	x	..	0°-180°	..	..	..	Insuff. rect. int.
24	m.	13	rt.	$\frac{1}{4}\frac{0}{0}$	..	80°	x	..	170°	..	x	x	
25	m.	30	left	$\frac{1}{2}\frac{8}{8}$	..	170°	..	..	80°	..	..	..	
			rt.	$\frac{1}{2}\frac{8}{8}$	..	90°	..	x	0°-180°	x	..	..	
			left	$\frac{1}{2}\frac{8}{8}$	..	0°-180°	..	..	90°	x	..	..	

V.—Table of Cases of $M + Am$. (*Compound Myopic Astigmatism*.)

Direction of Principal Meridians.										Direction of Principal Meridians.						Remarks.
No.	Sex.	Age.	Eye.	M.	Am.	M.*	Am.*	P.	Maximum of Curvature.				Minimum of Curvature.			
									Vt.	App. Vt.	App. H z	App. H z.	Vt.	App. Vt.	Ilz.		App. H z.
1	f.	24	..	$\frac{1}{11}$	$\frac{1}{28}$	..	..	x	120°	..	x	..	30°	..	x	Extremely amblyopic and very dull of apprehension. Without glass 200 Snellen not recognised at 16 feet by the left eye; with $-\frac{1}{7}$ s. it was just distinguished; with $(-\frac{1}{4}$ s. $\bigcirc - \frac{1}{18}$) c. V. nearly $\frac{20}{70}$. In reading holds head sideways, screws eyelids, and frowns, and if she persists she soon has much frontal headache. Without glass V. $L. \frac{20}{60}$ S. With $(-\frac{3}{40}$ s. $\bigcirc - \frac{1}{24}$ c.) V. almost $\frac{20}{20}$. This was advised for constant use, and for reading + $\frac{1}{24}$ c, which equalized the M. in the horizontal and vertical meridians. With these she read currently and comfortably "Bradshaw."† A teacher. "I cannot see the diagram-board across my class-room,
2	f.	20	rt. left	$\frac{1}{28}$ $\frac{1}{4}$	.. $\frac{1}{18}$	..	..	x	x 160°	..	..	..	70°	..	..	
3	f.	13	rt. left	$\frac{1}{40}$ $\frac{1}{40}$	$\frac{1}{24}$ $\frac{1}{24}$	..	..	..	90° 90°	x x	..	..	0° 180°	x x	..	
4	f.	20	rt. left	$\frac{1}{18}$ $\frac{1}{25}$	$\frac{1}{30}$..	..	..	..	0° 180°	..	x	..	90°	x	..	

* After use of atropine.

† This Railway Guide containing vertical and horizontal lines, and columnus of figures and names, is a good practical test.

V.—Table of Cases of $M + Am$ —continued.

Direction of Principal Meridians.										Remarks.
Maximum of Curvature.					Minimum of Curvature.					
	Vt.	App. Vt.	Hz.	App. Hz.		Vt.	App. Vt.	Hz.	App. Hz.	
11	90°	×	..	..	0°-180°	..	..	×	..	(- $\frac{1}{6}$ s. $\odot$ - $\frac{1}{30}$ c.) for outdoors, and - $\frac{1}{6}$ s. and (- $\frac{1}{6}$ s. $\odot$ - $\frac{1}{30}$ c.) for music, writing, and reading. A governess.
	90°	×	..	..	0°-180°	..	..	×	..	
12	0°-180°	..	..	×	90°	×	..	..	..	Spectacles of (- $\frac{1}{6}$ s. $\odot$ - $\frac{1}{30}$ c.) for outdoors, and (- $\frac{1}{6}$ s. $\odot$ - $\frac{1}{30}$ c.) for music at two feet distance. These suited her best.
	0°-180°	..	..	×	90°	×	..	..	..	
13	170°	..	..	×	..	..	..	..	..	- $\frac{1}{3}$ s. gave left V. = $\frac{20}{100}$; to right less than $\frac{20}{100}$. (- $\frac{1}{6}$ s. $\odot$ - $\frac{1}{30}$ c.) gave right V. = $\frac{20}{100}$, and (- $\frac{1}{6}$ s. $\odot$ - $\frac{1}{30}$ c.) to left V. about $\frac{20}{100}$.
	100°	..	×	..	10°	..	..	..	×	
14	0°-180°	..	..	×	90°	×	..	..	..	(- $\frac{1}{30}$ s. $\odot$ - $\frac{1}{30}$ c.) gave to right V. nearly $\frac{20}{100}$. + $\frac{1}{30}$ c., with axis in horizontal meridian of cornea, which equalized the M. ($\frac{1}{12}$), and

($-\frac{1}{30}$ s. $\odot$ $-\frac{1}{30}$ c.) gave to right V. nearly $\frac{20}{100}$, + $\frac{1}{30}$ c., with axis in horizontal meridian of cornea, which equalized the M. ($\frac{1}{18}$), and

V.—Table of Cases of $M + Am$ —continued.

Direction of Principal Meridians.										Remarks.									
Maximum of Curvature.										Minimum of Curvature.									

V.—Table of Cases of $M + Am$ —continued.

Direction of Principal Meridians.										Remarks.						
Maximum of Curvature.						Minimum of Curvature.										
	Vt.	App. Vt.	Hz.	App. Hz.		Vt.	App. Vt.	Hz.	App. Hz.							
36	m.	38	rt. left	$\frac{1}{8}$	$\frac{1}{30}$	..	..	x x	..	90° 90°	x x	..	..	..	Army surgeon. Eyes much tried by India. ($-\frac{1}{8}$ s. c. $-\frac{1}{30}$ c.) spectacles. A country medicus. "I was made aware of a peculiar defect by noticing that the lamp of a receding railway train became drawn out into a horizontal band, which ultimately broke in two." Cleric. Nipped eyelids much. ($-\frac{1}{11}$ s. c. $-\frac{1}{30}$ c.) gave him V. almost $\frac{2}{30}$; and with these he read comfortably and correctly his service books at 2 feet distance.	
37	m.	60	rt. left	$\frac{1}{10}$	$\frac{1}{40}$	..	..	x x	..	90° 90°	x x	..	..	..		His brother also has m. and am.
38	m.	50	rt. left	$\frac{1}{11}$	$\frac{1}{30}$	..	..	x x	..	90° 90°	x x	..	..	..	His brother also has m. and am.	
39	m.	9	rt. left	1	$\frac{1}{20}$	..	x	..	..	150°	..	..	..	x		His brother also has m. and am.
40	m.	26	left rt.	$\frac{1}{3}$	$\frac{1}{40}$	..	..	x	..	130° 30°	..	x	..	..	His brother also has m. and am.	

41	f.	25?	rt.	$\frac{1}{11}$	$\frac{1}{24}$	..	..	..	60°	..	×	..	..	150°	..	×	×	×	×
42	f.	36	left	$\frac{1}{11}$	$\frac{1}{24}$	..	..	..	120°	..	×	..	..	30°	..	×	×	×	×
			left	$\frac{1}{4}$	$\frac{1}{20}$	..	..	..	65°	..	×	..	..	155°	..	×	×	×	×
			rt.	$\frac{1}{4}$	$\frac{1}{20}$	..	..	..	115°	..	×	..	..	25°	..	×	×	×	×
43	f.	40?	rt.	$\frac{1}{32\frac{1}{2}}$	$\frac{1}{40}$	..	..	×	20°	..	×	×	×	110°	..	×	×	×	×
			left	$\frac{1}{32\frac{1}{2}}$	$\frac{1}{40}$	..	..	×	160°	..	×	×	×	70°	..	×	×	×	×
44	f.	41	rt.	$\frac{1}{72}$	$\frac{1}{36}$	..	..	×	160°	..	×	×	×	70°	..	×	×	×	×
			left	$\frac{1}{72}$	$\frac{1}{36}$	..	..	×	30°	..	×	×	×	120°	..	×	×	×	×
45	f.	23	rt.	$\frac{1}{30}$	$\frac{1}{36}$	..	..	×	30°	..	×	×	×	120°	..	×	×	×	×
46	f.	23	left	$\frac{1}{4}$	$\frac{1}{24}$	..	..	×	105°	..	×	×	×	15°	..	×	×	×	×
47	f.	23	left	$\frac{1}{4}$	$\frac{1}{24}$	..	..	×	90°	..	×	×	×	0°180°	..	×	×	×	×
48	f.	24	rt.	$\frac{1}{10}$	$\frac{1}{40}$	..	..	×	90°	..	×	×	×	0°180°	..	×	×	×	×
			left	$\frac{1}{10}$	$\frac{1}{40}$	..	..	×	0°180°	..	×	×	×	90°	×	×	×	×	×
49	f.	35	..	$\frac{1}{18}$	$\frac{1}{36}$	..	..	×	90°	..	×	×	×	0°180°	..	×	×	×	×
50	f.	35	left	$\frac{1}{4}$	$\frac{1}{20}$	..	..	×	0°180°	..	×	×	×	90°	×	×	×	×	×
				$\frac{1}{4}$	$\frac{1}{20}$	..	..	×	0°180°	..	×	×	×	90°	×	×	×	×	×

* After use of atropine.

Without glass 200 Snellen not recognized at 16 feet; with $-\frac{1}{4}$ s. 70 Snellen seen; with $(-\frac{1}{4}$ s. $\ominus \frac{1}{30}$ c.) V. = nearly $\frac{30}{80}$. For writing and reading, preferred $-\frac{1}{7}$ s. with same cylinders.

($+\frac{1}{30}$ c.), which equalized the myop., ($\frac{1}{30}$) greatly cleared print. Right lens slightly hazy.

Much asthenopia. For reading ordered $+\frac{1}{36}$ c. to equalize the myop. A year later she called and told me how great a comfort her glasses were. They had quite removed her fatigue.

Fond of sketching, but disabled by short sight. ($-\frac{1}{4}$ s. $\ominus -\frac{1}{30}$ c.) and ($-\frac{1}{7}$ s. $\ominus -\frac{1}{36}$ c.) spectacles prescribed for outdoors; and for writing and drawing, ($-\frac{1}{4}$ s. $\ominus -\frac{1}{30}$ c.), and ($-\frac{1}{12}$ s. $\ominus \frac{1}{36}$ c.). Both pleased her greatly; she had,

V.—Table of Cases of $M + Am$ —continued.

Direction of Principal Meridians.										Remarks.
Maximum of Curvature.					Minimum of Curvature.					
	Vt.	App. Vt.	Hz.	App. Hz.		Vt.	App. Vt.	Hz.	App. Hz.	
51	f.	21	rt.	1	..	..	..	..	..	she said, never before seen so sharply. Right very amblyopic. Corneal nebulae and synech. post., wide my. crescent. Left, with $(-\frac{1}{8}$ s. $\ominus -\frac{1}{8}$ c.) V. = $\frac{2}{3}$. Ordered spectacles, right, plane, smoked glass; left $(-\frac{1}{8}$ c.), axis vertical, to equalize m. $(\frac{1}{8})$, for reading; $(-\frac{1}{8}$ s. $\ominus -\frac{1}{8}$ c.) for outdoors; and $(-\frac{1}{8}$ s. $\ominus -\frac{1}{8}$ c.) for music. With these she saw comfortably and sharply. A surgeon's wife. Her left eye had been twice inflamed in early life, and a third time three years ago, after variola. The lens was cataractous, nucleus large and hard. qt. p.l. Field good. Tension perhaps +? With $(-\frac{1}{4}$ s. $\ominus -\frac{1}{8}$ c.) left eye had V. almost $\frac{2}{3}$; $(-\frac{1}{4}$ s.
52	f.	56	rt. left	$\frac{1}{12}$..	$\frac{1}{28}$ ..	.. ..	x ..	.. ..	.. ..	x ..

alone gave $\frac{26}{60}$). She came to me for a second opinion, having been told she must forthwith have an iridectomy done in both eyes. For this, I did not see any necessity. With $(+\frac{1}{4}\frac{1}{2} c.)$, to equalize the myopia, the right read No. 1 Snellen, easily, at 12 inches; and with $(-\frac{1}{4} s. \bigcirc -\frac{3}{8} c.)$, distant objects sharply. She has since several times visited me, and says she cannot be grateful enough for having saved her from an unnecessary operation. The T. of left eye normal, and sight of right continues good 4 months after her first visit.

A maternal uncle myopic.

An acute inflammation of eyes in boyhood, for which salivated by late Mr. Hodgson, of Birmingham. V. always defective. Has not used glasses, because could not find any to suit him. Ordered ($-\frac{1}{2}$ s. $\odot -\frac{1}{2}$ c.) for outdoors, and $-\frac{1}{2}$ c., to equalize myop. ($\frac{1}{12}$), for reading.

Ordered ($-\frac{1}{8}$ s.) $\odot$ ($-\frac{1}{40}$ c.) to wear outdoors, and ($-\frac{1}{14}$ s.) $\odot$ ($-\frac{1}{40}$ c.) for music.

[illegible]

* After use of atropine.

V.—Table of Cases of $M + Am$ —continued.

Direction of Principal Meridians.										Remarks.									
No.	Sex.	Age.	Eye.	M.	Am.	M. *	Am. *	P.	Maximum of Curvature.				Minimum of Curvature.						
									Vt.		App. Vt.	Hz.	App. Hz.	Vt.	App. Vt.	Hz.	App. Hz.		
56	f.	34	rt. left			$\frac{1}{10}$ $\frac{1}{20}$	$\frac{1}{10}$ $\frac{1}{20}$		160° 20°				70° 110°		x x		App. Hz.	..	Always conscious of some visual defect, which became lately more trying during preparation for an art scholarship examination. With — ($\frac{1}{10}$ s. $\odot$ — $\frac{1}{10}$ c.) V. = $\frac{2}{20}$. She called a few weeks later to tell me how well she now saw, adding, "I seem as if in a new world."
57	f.	50	rt. left	1 $3 + \frac{1}{2}$	$\frac{1}{20}$ $\frac{1}{20}$	.. ..	.. ..	.. ..	90° 90°	x x	.. ..	.. ..	0°-180° 0°-180°	.. ..	.. ..	x x	.. ..	Mother and several sisters myopic. She has large staph. post. and vitreous opacities.	
58	f.	50	rt. left	.. $3 + \frac{1}{2}$	$\frac{1}{10}$ $\frac{1}{30}$	.. ..	.. ..	.. ..	90° 0°-180°	x ..	.. ..	.. x	0°-180° 90°	.. x	.. ..	x x	.. ..	— $\frac{1}{10}$ c. gave V. $\frac{2}{20}$ nearly, and (— $\frac{1}{10}$ s. $\odot$ — $\frac{1}{30}$ c.) made left nearly same. "When a girl I was often scolded for making grimaces, which I did in order to see better. My sight is much improved when I draw the outer corners of my eyelids outwards."	

Always conscious of some visual defect, which became lately more trying during preparation for an art scholarship examination. With $-(\frac{1}{10}$ s. $\ominus - \frac{1}{10}$ c.) $V. = \frac{2}{30}$. She called a few weeks later to tell me how well she now saw, adding, "I seem as if in a new world."

Mother and several sisters myopic. She has large staph. post. and vitreous opacities.

$-\frac{1}{10}$ c. gave $V. \frac{2}{30}$ nearly, and $(-\frac{1}{10}$ s. $\ominus - \frac{1}{30}$ c.) made left nearly same. "When a girl I was often scolded for making grimaces, which I did in order to see better. My sight is much improved when I draw the outer corners of my eyelids outwards."

V.—Table of Cases of *M* + *Am*—continued.

Direction of Principal Meridians.										Remarks.							
No.	Sex.	Age.	Eye.	M.	Am.	M.*	Am.*	P.	Maximum of Curvature.				Minimum of Curvature.				
									Vt.		App. Vt.	Hz.	App. Hz.	Vt.	App. Vt.	Hz.	App. Hz.
68	f.	21	rt.	$\frac{1}{2}$	$\frac{1}{10}$	..	..	..	90°	×	..	..	0°-180°	..	..	Sister had m. + am., and father had one eye extremely myop.	
69	f.	25	rt.	$\frac{1}{10}$	$\frac{1}{30}$	..	..	..	90°	×	..	..	0°-180°	..	..	Two brothers myopic. She did not begin to use glasses till two years ago. Eyes soon tired by reading and drawing. ($-\frac{1}{10}$ s. $\odot -\frac{1}{30}$ c.) and ($-\frac{1}{10}$ s. $\odot -\frac{1}{30}$ c.) for out-doors; and ($-\frac{1}{20}$ s. $\odot -\frac{1}{30}$ c.) for music and writing.	
			left	$\frac{1}{10}$	$\frac{1}{30}$	..	..	..	..	130°	..	×	..	..	40°	..	($-\frac{1}{20}$ s. $\odot -\frac{1}{30}$ c.) for music and writing.
70	f.	35	rt.	$\frac{1}{30}$	$\frac{1}{2}$	..	..	..	20°	..	..	×	0°-110°	..	..	Slight insuff. rect. int. Uterine disorder. Latterly great mental anxiety. Much asthenopia, which was relieved by $-\frac{1}{24}$ s. and ($-\frac{1}{30}$ s. $\odot -\frac{1}{30}$ c.).	
			left	$\frac{1}{24}$	$\frac{1}{2}$	..	..	..	20°	..	..	×	0°-110°	..	..		
71	..	..	rt.	$\frac{1}{11}$	$\frac{1}{30}$	..	..	..	30°	..	..	×	120°	×	×		
			left	$\frac{1}{11}$	$\frac{1}{30}$	..	..	..	150°	..	..	×	60°	×	×		
72	..	..	rt.	$\frac{1}{6}$	$\frac{1}{30}$	..	..	..	70°	..	×	..	160°	..	..		
			left	$\frac{1}{15}$	$\frac{1}{30}$	..	..	..	..	70°	..	×	..	..	160°	..	Similar inclination of meridians.

VI.—Table of Cases of *Am* + *Ah*. (*Mixed Astigmatism*.)

Direction of Principal Meridians.										Remarks.					
Maximum of Curvature.					Minimum of Curvature.										
No.	Sex.	Age.	Eye.	Am.	Ahm.	Am. *	Ahm. *	Vt.	App. Vt.		Hz.	App. Hz.	Vt.	App. Vt.	Hz.
1	f.	13	rt. left	.. ..	.. ..	$\frac{5}{10}$ $\frac{9}{16}$	$\frac{1}{12}$ $\frac{1}{18}$	160° 40°	.. ..	.. ..	× ×	70° 130°	.. ..	.. ..	Right without glasses V. = $\frac{30}{80}$ with (+ $\frac{1}{4}$ c. $\ominus$ - $\frac{1}{30}$ c.) it rose to nearly $\frac{50}{80}$. Left without glass recognized C.C. and C. only at 16', i.e., V. = $\frac{20}{80}$ and $\frac{10}{80}$, with (+ $\frac{1}{18}$ c. $\ominus$ - $\frac{1}{36}$ c.) V. = $\frac{30}{80}$. Had undergone an operation by another surgeon for strab. convergens. When corrected V. almost $\frac{20}{80}$. Without glasses not even 200 could be distinguished at 16 feet.
2	f.	14	rt. left	.. ..	.. ..	$\frac{1}{24}$ $\frac{1}{12}$	$\frac{1}{16}$ $\frac{1}{16}$	90° 90°	× ×	.. ..	.. ..	0°-180° 0°-180°	× ×	.. ..	Civil service writer, and lately in the evening preparing for an examination. Five years ago had rect. int. cut by another surgeon, and now has divergence. Without glass C.
3	f.	45	rt. left	.. ..	.. ..	$\frac{1}{30}$ $\frac{1}{30}$	$\frac{1}{40}$ $\frac{1}{40}$	90° 90°	× ×	.. ..	.. ..	0°-180° 0°-180°	× ×	.. ..	
4	?	..	rt. left	.. ..	.. ..	$\frac{1}{20}$ $\frac{1}{30}$	$\frac{1}{20}$ $\frac{1}{30}$	80° 80°	.. ..	× ×	.. ..	170° 170°	.. ..	.. ..	
5	m.	17	rt.	.. ..	.. ..	$\frac{1}{36}$	$\frac{1}{36}$	80°	.. ..	×	.. ..	170°	.. ..	.. ..	

Right without glasses $V. = \frac{3}{8}0$, with $(+ \frac{1}{12} c. - \frac{1}{36} c.)$ it rose to nearly $\frac{2}{3}0$. Left without glass recognized C.C. and C. only at 16', *i.e.*, $V. = \frac{2}{3}00$ and $\frac{1}{16}0$, with $(+ \frac{1}{18} c. - \frac{1}{36} c.) V. = \frac{1}{3}0$. Had undergone an operation by another surgeon for strab. convergens. When corrected $V.$ almost $\frac{2}{3}0$. Without glasses not even 200 could be distinguished at 16 feet.

Civil service writer, and lately in the evening preparing for an examination. Five years ago had rect. int. cut by another surgeon, and now has divergence. Without glass C.

and C.C., quickly recognized at 16 feet, 70 Snellen hesitatingly. Was unwilling to have tendon re-adjusted. ($+\frac{1}{36}$ c. $\ominus -\frac{1}{36}$ c.) sharpened greatly 70 Snellen, but V. could not be brought quite to $\frac{20}{50}$.

"Always some defect" (lamellar cataracts). Right without glass could not recognize C.C. at 16', with ($+\frac{1}{18}$ c. $\ominus -\frac{1}{28}$ c.), saw 70 Snellen at same distance. Left V. improved from $\frac{16}{50}$ to $\frac{16}{60}$.

Right V. $\frac{20}{60}$, with $-\frac{1}{18}$ s. $\frac{20}{60}$. Left V. = $\frac{20}{60}$, with ($+\frac{1}{30}$ c. $\ominus -\frac{1}{30}$ c.) V. = $\frac{20}{60}$. For outdoors ordered $-\frac{1}{30}$ c., and $-\frac{1}{18}$ c. For desk-work, left ($+\frac{1}{50}$ c. axis vt. $\ominus +\frac{1}{28}$ s.), and ($+\frac{1}{18}$ c. axis vt.) for right eye. With these he read currently $2\frac{1}{2}$ Snellen at 1 foot.

Pupil teacher. Eyes soon tired, print swims. "I can't see a diagram-board across room." Without glass V. = $\frac{20}{60}$, with left ($-\frac{1}{18}$ c. $\ominus +\frac{1}{50}$ c.) V. rose to $\frac{20}{60}$. Determined by direct method, ophthalmoscopic examination, as she was too stupid and her V. too blunt to give correct data when

6	f.	17	..	rt.	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{24}$	$\frac{1}{28}$	$\frac{1}{36}$	..	75°	..	×	..	165°	..	×	..	×	..
7	f.	17	..	rt.	$\frac{1}{8}$	$\frac{1}{18}$	$\frac{1}{8}$	$\frac{1}{36}$	$\frac{1}{36}$	..	40°	..	×	..	130°	..	×	..	×	..
			..	left	$\frac{1}{8}$	$\frac{1}{18}$	$\frac{1}{36}$	..	..	..	60°	..	..	..	150°	..	..	..	..	..
8	f.	29	..	left	..	..	..	$\frac{1}{36}$	$\frac{1}{36}$	×	90°	×	..	..	110°	..	..	×	×	..
9	m.	..	..	rt.	..	..	..	$\frac{1}{18}$	$\frac{1}{36}$	..	90°	×	..	..	0°-180°	..	..	×	×	..
			..	left	..	..	..	$\frac{1}{36}$	$\frac{1}{36}$	..	90°	×	..	..	0°-180°	..	..	×	×	..
10	f.	18	..	rt.	..	..	..	$\frac{1}{28}$	$\frac{1}{18}$	×	90°	×	..	..	0°-180°	..	..	×	×	..
			..	left	..	..	..	$\frac{1}{18}$	$\frac{1}{36}$	..	110°	..	..	..	20°	..	..	..	..	..
11	f.	10	..	rt.	..	..	..	$\frac{1}{6}$	$\frac{1}{18}$	×	90°	×	..	..	0°-180°	..	..	×	×	..

* After use of atropine.

VI.—Table of Cases of $Am + Ah$ —continued.

Direction of Principal Meridians.										Remarks.					
Maximum of Curvature.					Minimum of Curvature.										
No.	Ser.	Age.	Eye.	Am.	Ahm.	Am.*	Ahm.*	Vt.	App. Vt.		Hz.	App. Hz.	Vt.	App. Vt.	Hz.
12	m.	25	rt. left.	.. ..	.. ..	$\frac{0}{10}$ $\frac{1}{1\frac{1}{2}}$	$\frac{1}{1\frac{1}{2}}$ $\frac{1}{1\frac{1}{2}}$	90°	×	.. ..	.. ..	0°-180°	.. ..	×	..
13	f.	16	?	.. ..	.. ..	$\frac{1}{40}$	$\frac{1}{24}$	50°	.. ×	.. ×	.. ..	140°	.. ..	×	..

* After use of atropine.

VII.—*Direction of Meridian of Maximum Curvature
(Strongest Refraction) in 320 Eyes.*

	Vertical.	Approximately Vertical.	Horizontal.	Approximately Horizontal.	No. of Eyes.
Simple Hypermetropic Astigmatism, Ah	13	12	6	3	34
Compound Hypermetropic Astigma- tism, H + Ah.	19	27	25	13	84
Simple Myopic Astigmatism, Am ..	18	8	14	2	42
Compound Myopic Astigmatism, M + Am	53	25	29	32	139
Mixed Astigmatism, comprising Am + Ah where myopia preponderates, and Ah + Am where Hypermetropia dominates	11	7	1	2	21
	114	79	75	52	320

PARALYSIS OF ACCOMMODATION, AFTER A FALL, ON THE
HEAD, IN A CASE IN WHICH A HIGH DEGREE OF LATENT
HYPERMETROPIA WAS PRESENT.

By HENRY POWER,

Senior Ophthalmic Surgeon to St. Bartholomew's Hospital.

The following notes were made at my request by Mr. George Ernest Alford, late house-surgeon of the Royal Westminster Ophthalmic Hospital :—

J. G., æt. 41, a coachman, came to the Westminster Ophthalmic Hospital on the 28th of February last. He said that a year ago, whilst hunting, his horse fell with him and he struck his head somewhat violently against the ground. Two months afterwards the same thing occurred and his head was struck on the same spot. His sight had always been very good until the first accident, but afterwards it became rather dim; and since the second accident it had been much worse, and he had been unable to read the newspaper, or to see anything clearly. He had violent headaches frequently, and stooping caused great pain in the head. He said that he only saw shadows of objects, that everything seemed to wave about, and that sometimes his sight went away completely for a short time. He always felt very giddy. None of these sensations were experienced until after he met with the accidents. *On admission* the pupils were both rather dilated and sluggish, but the movements of the eyes were perfect and there was no ptosis. On ophthalmoscopic examination the media were clear and the vessels of the retina congested. Hypermetropia of a high degree was evidently present. His vision was as follows (after the instillation of atropine) :—

Right Eye.—V. = $\frac{8}{200}$, and reads No. 15.

With + $4\frac{1}{2}$, V. = $\frac{20}{200}$. With + $3\frac{1}{2}$, reads No. $3\frac{1}{2}$ at 6 inches.

Left Eye.—V. = $\frac{20}{200}$ only.

With + $4\frac{1}{2}$ V. = $\frac{20}{200}$. With + 3 reads No. 11.

His movements were rather strange, but the great defect of vision was considered sufficient to account for this.

Nothing further was discovered the next day by Mr. Power, save that the lenses were both in their proper position, as shown by the reflections of a candle from their anterior and posterior surfaces. Quinine and iron were ordered, and the pupils kept dilated with atropine. His vision was taken daily and remained the same.

On the 15th of March he was again examined by Mr. Tweedy of University College Hospital, who, with Mr. Power, was quite satisfied that the lenses were in position. The vision of the *left eye* was then found to be with + $4\frac{1}{2}$ = $\frac{20}{100}$. With + $4\frac{1}{2}$ and - 42 cylindrical \ V. = $\frac{20}{80}$.

On the supposition that his accommodation had been paralysed by the accident, whilst a high degree of hypermetropia existed which had been previously undiscovered, he was kept in a darkened room for some days, a couple of leeches applied to his left temple, some iron and strychnine given to him, and atropine was also discontinued. He suffered from violent head-aches and great giddiness for the next few days, probably owing to the long strain upon his eyes, as they recurred after each examination.

On March 21st, the man, having been again carefully examined by Mr. Hutchinson, with Mr. Power, and feeling much better in health, having no headache or giddiness, a solution of Calabar bean in distilled water (gr. iv., ad. $\mathfrak{z}$ i.), at Mr. Hutchinson's suggestion, was dropped into both eyes. In half an hour he could read a newspaper with ease, and could see better, he said, than he had done for twelve months. The improvement effected by the drops was slightly less the next morning, so they were repeated with an equally good result. His vision, one hour after the drops had been instilled, was as follows:—

Right Eye.—V. = $\frac{2}{7}\frac{0}{0}$. Reads No. 2 easily, and No. $1\frac{1}{2}$ with difficulty.

With + 6 reads No. 1 and V. = $\frac{2}{4}\frac{0}{0}$.

Left Eye.—V. = $\frac{2}{10}\frac{0}{0}$. Reads No. 2.

With + 6 reads No. $1\frac{1}{2}$ and V. = $\frac{2}{4}\frac{0}{0}$.

On March 31st he was discharged, and the following note was taken—

“He has had no headache or feeling of giddiness during the last week. The effect of the Calabar bean is sufficiently lasting to enable him to read the newspaper on the third day after its instillation.

The high degree of hypermetropia here present in both eyes, which had been entirely overlooked by the patient, is very remarkable. The injuries to the head he received in his falls obviously weakened his voluntary and involuntary power of accommodation, and impaired vision was the result. At the first glance the high degree of hypermetropia gave a haziness to the margins of the optic disc, when examined with an ordinary Liebreich's ophthalmoscope, that coupled with the account of the injuries, led to the belief that double optic neuritis was present, and suggested serious intracranial mischief. When, however, the hypermetropic condition was recognised, and such material improvement in the vision found to be effected by a convex glass of four and a half inches focus, it was thought that there must have been complete dislocation of both lenses, highly improbable as this might be. This momentarily-entertained idea was, however, set at rest by the application of Purkinje's catoptric test, which showed clearly that both lenses were in place; besides which, there was no tremulousness of the iris, nor any indication of their being dislocated on ophthalmoscopic examination. The case may prove serviceable in relation to railway cases when considerable loss of vision is complained of after comparatively trifling injury.



CASE OF SUDDEN AMAUROSIS, ASSOCIATED WITH CHOREA.

By H. R. SWANZY, A.M., M.B., F.R.C.S.I.,

*Surgeon to the National Eye and Ear Infirmary, Ophthalmic
Surgeon to the Adelaide Hospital, Dublin.*

Lizzie B., æt. 10, was brought to the National Eye and Ear Infirmary on 1st May last, complaining of the sight of her left eye. On 15th April the child had been out all day watching a public funeral, and came home in the evening suffering from frontal headache. Next morning, while washing her face, she discovered that the left eye was blind. The parents did not seek medical advice for a fortnight afterwards, believing that the affection would wear off. The headache continued for nine days, and has not returned since then.

Upon making a functional examination I found that vision was absolutely wanting in the eye, bright light not being distinguished from darkness. The pupil, which was dilated, reacted sluggishly when the light fell into the eye.

The ophthalmoscope revealed those appearances which until lately were generally accepted as characteristic of embolism of the central artery of the retina. The artery in all its branches was pale and diminished in calibre, but not quite bloodless. The vein was also somewhat smaller than in the normal. There was some haziness of the retina around the optic disc, especially above and to the outside, but this haziness did not advance quite up to the margin of the disc. At the macula lutea there was the well-known crimson spot, surrounded by a broad zone of retinal cloudiness.

I observed that the child was affected with chorea, which was more marked in the left leg and arm than elsewhere, and

was informed by the mother that this had made its appearance almost simultaneously with the blindness. No cardiac disease could be found. The patient has never had any illness, beyond mild attacks of whooping cough and measles.

10th May. A bright light is distinguished to-day from a dark shadow.

14th May. Fingers are counted centrally at a distance of 3'. The haziness around the disc is now quite gone, and that near the macula lutea very much lessened. The crimson spot has become more diffused and less intense in colour. The chorea is also better.

20th May. Fingers counted at 5'. The lower third of the field of vision is still wanting. The optic disc is becoming white. The crimson spot continues, and also the nebula surrounding it. The appearance of the vessels remains in general similar to that observed at the first examination, but there is one arterial branch passing downwards and inwards, which seems to be completely obliterated, and presents the appearance of a thin white thread.

1st June. Since the last visit the obliterated branch has recovered so far as to differ in no way from its fellows. Very slight chorea still remains.

14th July. The functions continue unaltered. The optic disc is whiter. The crimson spot is fainter, as likewise the surrounding nebula. The chorea has quite disappeared, the patient's mother having seen nothing of it for a fortnight.

The treatment consisted in bromide of potash and iodide of potash.

I am rather at a loss to indicate the nature of the foregoing case. No doubt it was either embolism of the central artery of the retina, or hæmorrhage of the optic nerve. Since the appearance of Dr. Hugo Magnus' work (*Die Schnerven-Blutmagen*: Leipzig, 1874) we are obliged to distinguish between these two very different conditions, which produce such similar ophthalmoscopic appearances. One of

the most important points for the diagnosis (the period at which the infiltration of the retina appears) can only be observed within the first few days after the occurrence of the blindness, and the patient in this instance did not come under notice for a fortnight. According to Magnus, in cases of hæmorrhage of the optic nerve the retinal veins are distended, while in embolism they are contracted, as they were in this case. The complete but temporary blocking of one branch, as noticed on 20th May, would also speak for embolism. The recovery of partial sight in a large portion of the field of vision, one-third of the field still remaining defective, is a circumstance which I am unable to explain. There is now no branch of the retinal artery more blocked than another, nor when one branch did seem completely blocked did the defect in the field correspond to the portion of retina supplied by this vessel.

A chief point of interest in this case, and my principal reason for bringing it forward, is the coincidence of the chorea. The readers of this journal are acquainted with Dr. Hughlings Jackson's hypothesis, that the proximate cause of chorea is embolism of capillary vessels in the region of the corpus striatum. Were I competent to discuss this theory, this would not be the place to do it. I have wished merely to publish the above case as a clinical observation, which may be taken, so far as it goes, as a proof of the theory I refer to.

CASE OF ANOPHTHALMUS.

By HENRY WILSON,

Professor of Ophthalmic and Aural Surgery, Royal College of Surgeons, Dublin.

The following instance of absence, or apparent absence of eyeballs came under my notice in 1873, the subject of it having been brought to me on account of an aural affection :

A. K., aged 13, the daughter of cousins and one of four children, one of whom is said to have died of water on the brain, presents a peculiar physiognomy (reminding one of Guépin's* forcible though coarse description) in which the prominent mouth, small badly developed lower jaw, high cheek bones, and absence of eyes, are the most striking features. The teeth are irregularly set, but present no other peculiarity. The hands are cramped, the fingers bent on the carpus, and the whole bent towards the forearm. This condition was attributed to the infant always holding something in its hands, but this explanation is doubtful, more particularly when it is considered that there was also flexion of the feet; the left foot had been turned inwards, but was now cured by operation. The child had been born blind, and now presented the following appearances:—Breadth of forehead 5", height 2", span of open eyelids $\frac{7}{16}$, eyelids are fairly developed, but the palpebral opening is very small, and the edges of the eyelids generally in apposition; the eyebrows are very badly marked and the hair scanty; the punctum in each lower lid is present, but I could not see it in the upper lids; the lids are constantly in motion, though the upper one is not raised; inside is a conjunctival space lubricated with tears; occasionally tears pour over showing the lachrymal gland to be present; the muscles also are present, and are evidently attached to the conjunctiva or something (? Tenon's capsule) behind it, and are seen to move much as they behave after enucleation. The girl can distinguish between bright sunlight and darkness by the heat of the former.

* *Annales d'Oculistique*, t. vii.

A CASE OF CONJUGATE DEVIATION OF THE EYES.

By PRIESTLEY SMITH,

Ophthalmic Surgeon to the Queen's Hospital, Birmingham.

The following case is recorded as an illustration of the fact that there exist in the brain, centres which preside over the lateral parallel movements of the eyes, which centres are distinct from those which govern the movements of convergence.

Should the symptoms appear not to warrant the interpretation given to them, their unusual nature will, I think, justify publication.

George M., æt. 17, a well-grown, intelligent, healthy looking lad, by trade a milkman, came to the Eye Department of the Hospital, on April 27th, 1875.

The case, at first glance, looked like paralysis of the left sixth nerve. Both eyes were turned somewhat to the right, to counteract which the face was turned to the left. It was found, however, that not one only, but both eyes, deviated *fixedly* towards the right, and that neither had any power of movement towards the left.

The history given by the patient was this:—About a week before, he had had “a bad bilious attack,” viz., violent vomiting and retching, continuing for several days, accompanied by great pain in the head, giddiness, and after the vomiting had lasted three days, “something wrong with the eyes.”

A more thorough examination of the ocular symptoms than was possible during the Hospital visit, was made the same afternoon.

Right eye V. = 1 ($\frac{1}{2}$); emmetropia; near point at $4\frac{1}{2}$

inches; pupil medium size, active; media clear; fundus normal.

Left eye V. = $\frac{1}{30}$; emmetropia; near point at 5 inches; pupil medium size, active; media clear; fundus differed from that of the right eye in having a well marked atrophic crescent on outer side of disc; no other difference was observed to account for the imperfect vision—no astigmatism.

There was frequent winking of the right eyelids, accompanied by a similar, though incomplete, winking of the left. The lids were rather more widely open on the left side than on the right, the fault being probably in the right, for the right upper lid appeared to droop slightly, and the skin of the right half of the forehead was in horizontal wrinkles.

Each eye was examined separately as to its deviation.

The *right* maintained a constant deviation of 20° to the right, the effect of which the patient neutralised by carrying the head turned towards the left. A prism of 20° , base towards the nose, enabled him to carry his head in the natural position. If the prism was removed while the eye was fixed on a distant object, the head immediately rotated as before. No effort on the part of the patient to follow an object moved slowly in front of him towards his left, induced any movement of the eye. On attempting to follow the object further towards the right, on the contrary, the eye made an excursion of about $\frac{1}{16}$ th or $\frac{1}{12}$ th of an inch, not, however, in a natural manner, but with a jerking movement, returning at once to its former position. Upward and downward movements appeared easy and of normal, or very nearly normal, extent.

The *left eye* presented an exactly parallel deviation; viz., a constant deviation of 20° towards the right; an absolute loss of voluntary movement towards the left; a slight power of further rotation towards the right; and, finally, normal upward and downward movements. There was no diplopia in any position of the head. To ascertain that both eyes were actually concerned in vision, a prism, base downwards,

was placed before the left; double vision was at once produced.

Here, then, was *total loss of the parallel associated movement of the eyes towards the left, and impairment of the corresponding movement towards the right.*

The deviation seemed identical with that described by Dr. Hughlings Jackson, as one of the symptoms in what he calls the "second degree of hemiplegia." (See Part 1, vol. viii, of this Journal, p. 96.)

In referring to Dr. Jackson's paper, I now observe an additional point of resemblance, of which I was ignorant when the notes of this case were taken, namely, the unsymmetrical action of the eyelids. I quote the following paragraph (p. 99.) "In this attack I observed, further, that the two eyes were well turned to the left before the eyelids were closed—the eyelids were indeed at that time very widely open—and that later the eyelids rapidly opened and closed, the left eye closing very much, the right eye not closing completely or strongly, at all events. It was not noted whether the left eye closed oftener than the right." My case was the converse of this; the eyes turned to the right, and the right lids closed more completely than the left. In my case it was noted that the movements on the two sides, though unequal, were synchronous.

The impairment of lateral movements having been ascertained, it next became interesting to discover whether the movements of convergence were impaired also, a question which, in case of hemiplegia with conjugate deviation, cannot, I imagine, be decided, requiring, as it does, intelligent volition on the part of the patient for its solution.

The patient was told to fix his eyes on an object held at 10 feet distance and somewhat to his right, and to continue to look at it as it approached his face. Binocular fixation was accomplished without difficulty up to 5 inches from the face; in short *the movements of convergence were intact.* This involved a remarkable phenomenon, viz., the right eye which had before refused to move towards the left, now made a

considerable excursion (about 15°) in this direction; in fact, the right eye seemed to converge rather more freely than the left. Further attempts were then made to induce the eye to perform the same excursion by *lateral* movement of an object in front of the patient, but, as before, absolutely without success. To state this phenomenon in other words, the right internal rectus muscle contracted perfectly, or not at all, according as the attempted movement associated it with the internal, or the external, rectus, respectively, of the other eye. The unavoidable inference from this is that the branch of the third nerve, which is, in either case, the channel of communication, connects the muscle with two distinct centres in the brain, one of which presides over the parallel lateral movement of the eyes (which has been compared to the hand of a driver turning a pair of horses by one rein), and the other over the differently associated movements of convergence.

That such centres actually exist in ascertained localities, appears to have been well established both by clinical and experimental investigation. In the paper by Dr. Hughlings Jackson above referred to, may be found references to the writings and experiments of Donders, Ferrier, Hitzig, Adamük, and others, bearing on this subject.

The progress of the case recorded in the present paper was as follows:—

Ten grains of iodide of potassium were given thrice daily. A week later the condition of the eyes was again investigated and appeared unchanged. The pain in the head was much less severe. It was felt chiefly in the left temporal and frontal regions, in which situation it had throughout been the most severe, though spreading sometimes “over the whole head.”

At the end of a second week the pain was almost gone; power of movement towards the left was beginning to reappear in each eye, though much more in the right than in the left; in both the movements were of a jerking character, the oscillations being performed around the vertical axes of the eyes, and therefore, attributable to the lateral muscles.

Three minims of liq. strychnia were given thrice daily, and the iodide was discontinued.

On May 27th, a month after his first visit, the conditions were as follows:—the pain was entirely gone. *The right eye* followed an object easily to either side, making an excursion of normal, or nearly normal, extent, in each direction, but oscillating considerably when turning its maximum in either. This eye now maintained its natural position, fixing objects in front of the patient, who consequently carried his head in the natural position.

The left eye still retained a position of deviation to the right. In following an object moved laterally, it turned inwards to the normal extent, but oscillated with extreme inversion. Outwards, on the other hand, it turned scarcely beyond the middle line, and oscillated on attempting to do so.

Parallelism was now lost for all positions.

The left eye had a constant inward deviation, increased by looking towards the left, diminished by looking towards the right; in accordance therewith, the patient complained of constant and troublesome diplopia, the images standing nearer together in looking to the right, farther apart in looking to the left. The horizontal folds before observed in the right forehead had disappeared, and winking occurred only to a natural extent, and equally on the two sides. The acuity of vision, and the ophthalmoscopic appearances were unchanged.

In this condition the patient remains at the present time (June 25th). If, after an interval of time, and the employment of Faradisation over the left eye, the strabismus still remains, it is my intention to resort to tenotomy.

Although during recovery, the conditions in this case have become unsymmetrical, I believe the symptoms recorded justify the diagnosis of *a lesion of a centre, or centres, presiding over lateral movements of the eyes*. To venture farther than this, beyond the province of ophthalmology, I feel to be unsafe, but I may make one or two quotations which bear on the case.

Dr. Hughlings Jackson, in the article before alluded to, says that the eyes turn *from* the side paralysed in hemi-*plegia* (*i.e.* to the side of the brain lesion), while they turn *to* the side convulsed in hemi-*spasm* (*i.e.* *from* the side of the brain lesion).

Dr. Ferrier states that the centre presiding over lateral deviation of the eyes and head is "situated in the convolutions of the frontal region." (West Riding Reports, vol. iv, p. 52.)

The centre for convergence of the eyes is stated by Dr. Jackson and Dr. Ferrier to be situated in the cerebellum.

From these data, it would seem that the deviation in my case must have been due to tonic spasm, rather than to paralysis as I had surmised.

The pain was chiefly in the *left* forehead and temple; the eyes turned to the *right*; the corrugation of the right forehead and the winking of right lid coincide with a supposed lesion of the left brain, as similar symptoms on the left side coincided with an actual lesion of the right brain in Dr. Hughlings Jackson's case of hemi-spasm; and finally, the supposition of tonic *spasm* of the right lateral muscles of the eyes, accounts for the impairment of further movement towards the right, as well as for the loss of movement towards the left, which would not be explained by a supposed *paralysis* of the left lateral muscles of the eyes. On this latter point, however, I do not venture to speak with any confidence.

REPORT ON THE FORMS OF EYE DISEASE WHICH OCCUR
IN CONNECTION WITH RHEUMATISM AND GOUT.

By JONATHAN HUTCHINSON.

(Continued from vol. vii, page 493.)

CASE LXXXVIII.—*Relapses of Iritis first in one Eye, then in the other, attended by much inflammatory swelling of Conjunctiva and Lids, and effusion of Blood into Anterior Chamber; the blood coagulating and not gravitating—Rapid recovery under Treatment—No Syphilis or Gonorrhœa—Slight Arthritic history.*

Francis T., had his first attack of iritis, in one eye only, at the age of 17; two years later the other eye suffered in the same way, and a year later a third unsymmetrical attack is noted. On these occasions he was under Mr. Dixon's care, and states that after treatment (iodide of potassium with full doses of bichloride of mercury) his eye had improved so much that whereas on admission he was not able to read the largest type, in a week he could see the smallest.

His eyes then remained well for five years, when he came under my care (*Sept.—Oct.*, 1869) with a fresh and severe attack of inflammation in the right eye (this was his fourth attack). There was patchy congestion in the ciliary region. The attack had begun ten days before, and about two days after he had been out shooting on a cold day. For the first week he had no great pain, but after that he was kept awake by its increasing severity. The state of the eye was peculiar; there was great chemosis; the iris was much thickened, and there was dark coloured blood effused into the anterior chamber. It had not gravitated to the lowest part of the cavity, but occupied the inner and lower third, adhering to the angle between cornea and iris, and following their circumferential curve. The lids were also swollen. The general aspect of the case resembled iritis from injury or from sympathy; there was, however, no history of any hurt to the eye. He could barely count fingers. I prescribed mercury and opium pill twice a day, atropine, a leech and a blister to the temple. The pain was relieved almost immediately by the leech. Three days later the pupil was

fairly dilated, he had much less pain, and the blood in the chamber had partly disappeared; a week after I first saw him there was no trace of blood remaining.

Before his first attack, Francis T. had never had any form of venereal disease; four months before the second attack he had a chancre, but it soon got well and was not followed by any known secondary symptoms. He married at 20, and when I saw him he had three children, all reported to be in good health. He denied ever having had gonorrhœa. There was no history of arthritic disease known in his family, but his father had had some eye-affection; he himself was subject to occasional pains and stiffness in his hips and knees, but these never were enough to lay him up; he had not had rheumatic fever. There were no lips on the condyles of his femurs.

In *December*, 1871, he had his 5th attack, again accompanied by hæmorrhage. The 6th, a very slight one, occurred in the winter of 1872-73; the 7th and last, so far as I know, was in *September*, 1873, after exposure to cold and wet at the sea-side, when he had been swimming a long distance and also trying the eyes by long looking at the float in fishing. It was similar in all respects to the one above described (the 4th) but rather less severe, and like it and the other attacks, very rapidly passed off, leaving no synechiæ. A week after its commencement he was discharged well, the only evidence of iritis then to be found being a ring of small dots of pigment on the lens capsule. The pain had been very severe in the early stage.

I did not elicit any further facts of great importance as to his own or his family history. He stated, however, that he was subject to a very slight form of recurrent gleet with only the very smallest quantity of discharge, and that he had been subject for some little time to repeated rheumatic pains in his hips and knees. He has never suffered from epistaxis.

CASE LXXXIX.—*Severe Rheumatism of three months' duration before any Venereal Disease—Gonorrhœa several times afterwards—Syphilis and perhaps Syphilitic Iritis followed by Rheumatism—Four years after the Syphilis, double Iritis, with interval of 2 mos. between the two. Eyes; spontaneous Urethritis, nocturnal pains in Bones—Mother very Rheumatic.*

Horace G., æt. 26, was under care in *January*, 1872, and

again two months later, in *March*, for iritis, first of the right then of the left eye. He was under care a month or five weeks each time. The first attack was attended by slight chemosis with a gray rim round the cornea, and considerable haze of cornea. It was also attended by much nocturnal aching in the tibiæ, and for a few days by slight spontaneous urethritis; he had never before had urethral discharge without contagion. The iritis in the left eye came on the day after a drive in an open trap through a snow-storm. He attributed the escape of the right on this occasion to its being shaded. The patient had been married two years when I saw him and had one child reported to be in good health. He is a stout, rather flabby man with black hair, a commercial traveller in provisions.

At the age of 20, before he had had any venereal disease, he was laid up for three months with "rheumatic fever;" his joints were very painful and somewhat swollen; his medical attendant examined his heart and told him it was not affected during the rheumatic attack. This attack came on after a walk in cold weather with unusually few clothes on. Soon after this he had gonorrhœa, and two years later a chancre followed by "quinzy." Several months after the chancre he was again laid up for three months with rheumatism, brought on as he thinks by sleeping in a damp bed. He had slight inflammation of his eyes about the same time, and the doctor who attended him for the rheumatism told him that the eye disease was syphilitic. He got perfectly well of his rheumatism and remained without further trouble till the iritis for which I treated him.

His mother at the age of 26 had "rheumatic fever" and ever afterwards suffered very much from "rheumatism" and "rheumatic gout." No other relatives were known to have had rheumatism or gout. The patient said that he resembled his mother more than his father.

XC.—Unsymmetrical Iritis in a Man who had suffered from repeated attacks of "Rheumatic Gout"—No family history of Arthritis.

John G., aged 43, has a pale complexion, sea-weed congestion of the cheeks and sandy hair. He has been subject to attacks of inflammation and swelling of his knees and feet at times during the last fourteen years. He believes that it was caused

in the first instance by working at an iron foundry where the rooms are very hot. His medical attendant told him it was "rheumatic gout." In *November* and *December*, 1871, he had iritis of his left eye lasting for about two months, and as the inflammation of his eye was getting better the knee and ankle on the same side swelled. The eye has been damaged as to sight since he had a blow on it from a shutter twelve years ago. He has doubtful lips on his left femur, none on the right. Neither his parents nor grand-parents had either gout or rheumatism so far as he knows.

CASE XCI.—*Severe Articular Rheumatism attributed to living in a damp house—Subsequent liability to slight Joint Attacks and to Neuralgia—Iritis of one Eye six years after the first Rheumatism; severe, prolonged and remittent—Iridectomy twice during Acute Inflammation, followed by much relief. History of Syphilis many years before either the Rheumatism or the Iritis—Tertiary Symptoms complicating his Rheumatic Affection.*

Rudolph A., aged 40, a gas-meter prover, was admitted at Moorfields, at the end of *January*, 1872, with severe acute iritis of his left eye. There were many synechiæ and much congestion. There were no nodules in the iris. It had been going on for three weeks. He was a florid, light-haired German, well made and very healthy looking. He remained under my care for four months, and was finally discharged with much damaged vision in the left eye. During this time, several remissions took place, but the inflammation never entirely ceased. For some time there was haze of the cornea, with dots on its posterior surface. The inflamed eye gave him, on the whole, a great deal of pain. He suffered also on and off from rheumatic pain in his right shoulder, and from severe neuralgia of the right side of face, head, and neck. I ordered him iodide, bicarbonate and nitrate of potassium with colchicum, repeated local blistering and leeching, and atropine. He always bore strong testimony to the great relief to pain afforded by leeching the temples; he had about twenty-four leeches during the first three months. His eye improved rapidly for the first week or two, but then got worse and remained so. At the end of two months, finding his eye, if anything, rather worse than better, still very painful

and acutely inflamed, I performed iridectomy upwards. Much relief followed the operation, and for the next three weeks he had little or no pain in the eye, and less congestion. Then another relapse of pain and inflammation came on and a second iridectomy (downwards) was done, in my absence, by Mr. Streatfeild. The effect was quite as marked as that of the first operation and lasted till he ceased attendance six weeks later. It should be mentioned that, at the time of the second iridectomy, he was taking bichloride of mercury in one-sixteenth of a grain doses, with five grains of iodide of potassium; as, however, he had been taking this mixture, instead of the one ordered at first, without benefit, for a week before the operation, it is fair to attribute the relief to the surgical procedure. The mercury was continued till he was discharged in *May*.

He had a slight relapse (in the opposite eye) about three months after his discharge from hospital (in *August*, 1872). I saw him again in *December* of the same year, and found that the attack had left no traces of iritis.

Six years before the iritis began he was laid up for two months with "rheumatic fever;" many large and small joints were swollen. It came on soon after he had gone into a new damp house. Since this attack he has remained liable to occasional swellings of the knees, wrists, and fingers. He has, probably, also had rheumatic inflammation of his jaw; for a year before the iritis, he was under care at a hospital for stiffness of this joint, and had it forcibly moved under chloroform. It is possible that the inflammation was located in his left eye by a severe blow on the corresponding eyebrow, which occurred four years before; it "blackened" the eye, and has left a scar on the eyebrow. He has slight lips on the condyles of his femurs.

It is almost certain that he had syphilis many years before his rheumatism (at about the age of 18, or twenty-two years before the iritis). The chancre does not appear to have been followed by secondary symptoms; but during the two years preceding his iritis, he had swellings on his shin-bones and a considerable swelling over the right lower jaw, which was diagnosed by a surgeon to be a tumour requiring excision; it quite disappeared, however. He is married and his wife has had several miscarriages and has lost three children, but none have died below the age of eighteen months. There is no history

of syphilitic symptoms in any of them. I have tried to follow him up recently (*July*, 1875) but without success.

CASE XCII.—*Five attacks of severe Gonorrhœal Rheumatism, followed by several attacks of unsymmetrical Iritis—Patient the fifth child—His elder brothers and sisters slightly Rheumatic—Inheritance of Arthritis from both Parents—Patient probably the subject of Syphilis acquired after his first Iritis.*

Edwin G., æt. 29, bookbinder, has light brown hair and gray eyes. He was admitted at the Moorfields Ophthalmic Hospital on *February* 1, 1872, for his first attack of iritis; the left eye was affected. There was considerable sclerotitis as well. He was under care for about six weeks, using iodide of potassium, blisters, and atropine, but was quite well for three weeks before he left off attending. There was no iritis of the other eye.

This patient is the youngest but one in a family of six; some of his brothers and sisters have had slight rheumatism, but none have had it severely. His father (a coachman) has had several attacks of gout in the great toes, while his mother is crippled with rheumatism in her hip and has it also in her hands and arms. He thus inherits the arthritic diathesis from both parents. He himself has had five attacks of rheumatism, always accompanying or following gonorrhœa; he has never had rheumatism without gonorrhœa. The first of these illnesses occurred at the age of 20, the last in *July*, 1871, six months before I saw him. He has sometimes been laid up for nine months with the rheumatism. The parts chiefly selected are the knees, elbows and hands; these joints swell up a good deal. He is well betweenwhiles, excepting occasional pains; he sometimes notices that the day after he has been using a hammer, his hands get stiff and he is obliged to put them into hot water before he can open them. He has never had urethritis without contagion. He has always drunk beer moderately. There was no articular rheumatism when he had his iritis.

Subsequently during the summer of 1872 (*May* to *November*) he was again laid up for six months by rheumatism in his feet, knees, hands and shoulders; the wrists and many small joints of the hands were affected; this attack was not connected with gonorrhœa, from which, indeed, he had not suffered for three or four years.

In *January*, 1873, he was again at Moorfields for iritis in the right eye (its first attack), and was under care till the end of *April*. During this time the eye was once nearly well, but relapsed, apparently because he began to use it again; he said that it became red within an hour of his resuming work (book-binding). While under care, he had some rheumatism in the right hand and right hip.

In *September*, after a blow on the left eye, a relapse of iritis occurred in it.

On *October 2nd*, there was a ciliary congestion and irritability of both eyes, and flying rheumatic pains in the knees, ankles, &c. The eyes were examined with the ophthalmoscope at this date, and it was noted that there were no opacities in the vitreous of either.

In *February*, 1874, the left again inflamed; he attributed it to a blow from a potato.

On *February 15*, 1875, he again applied for acute iritis of the left, of three days' duration. It had come on whilst standing in a draught, two or three evenings before; there was also some recent swelling of the elbows. The iritis came on the evening after a night's drinking. There was no gonorrhœa.

With regard to syphilis, no evidence of it was present during his first attack of iritis. While under care for the second attack (in *March*, 1873), however, I found that he had a sore place within the lower lip and a scar on the tongue. They were undoubtedly of tertiary syphilitic character. He was not aware that he had ever had a chancre or any secondary symptoms, unless an ulcerated throat which had occurred during a gonorrhœa six or seven years previously, was of that nature. If, as seems highly probable, he did suffer from syphilis on the above mentioned occasion, it must still be observed that he had no iritis whatever until several years later; his first iritis was in *February*, 1872; whilst, if his account is correct, the ulcerated throat must have occurred in 1867 or 1868.

CASE XCIII.—*Kerato-Iritis of one Eye. A very prolonged attack of Rheumatic Arthritis several years earlier—No Gonorrhœa—Family history of Arthritis.*

Edward G., a labourer, æt. 40, has a pale complexion, brown hair, and gray eyes. He came under care for kerato-iritis of the

left eye, the lower part of the cornea being hazy; this was in *February*, 1872. For several days before the eye inflamed he had had some rheumatism in his shoulders and elbows.

He stated that five or six years before the iritis he had been laid up for thirty-six weeks with "rheumatic fever;" his joints were much swollen, very red, and painful. He got perfectly well and had only had slight reminders of it since. He denied ever having been exposed to the risk of catching any venereal disease. He was not aware of any history of arthritic diseases, although he said that he had known both his parents and all his grand-parents. He attributed his rheumatism to damp and cold.

CASE XCIV.—*Slight Rheumatism in Joints, followed in five or six years by Unsymmetrical Iritis—One year later severe Joint attack, followed after four years by the second Iritis—Gonorrhœa many years before any Rheumatism whatever—Severe Rheumatism in his sisters.*

William H., æt. 40, formerly a sailor, now a shoemaker, had his second attack of inflammation in the left eye in *March*, 1872; there was well-marked iritis (excluded pupil), and a good deal of conjunctival congestion. This attack came on a day or two after he had had a blow on the eye from an open hand. The former attack had occurred in the same eye five years before. On neither occasion had he any rheumatism. He was under care for about three weeks; he obtained much relief from the artificial leech and free blistering, together with iodide and bicarbonate of potassium. He is a florid spare man, with blue eyes, and light brown (almost sandy) hair.

Four years before I saw him, and about a year after the first inflammation of the eye, this patient was laid up for nine months with rheumatism in the right knee, left foot and both shoulders; five or six years previously, however, he had begun to suffer from rheumatism in his joints. Since then he has often had slight rheumatism. Two of his sisters have suffered severely from arthritis; one, when young, had "rheumatic fever," the other has rheumatism in the hands and knees. No other relatives are known to have had rheumatism or gout. Several (six or seven) years before he had the least sign of

rheumatism he had gonorrhœa and a chancre, but nothing else. This was seventeen years before the severe arthritic attack.

CASE XCV.—*Repeated attacks of Acute Joint-Inflammation (? Gout or Rheumatic Arthritis); two of Unsymmetrical Iritis—Urethral discharge of doubtful character between the Arthritic attacks—Family history of Arthritic Diseases.*

Robert B., æt. 32, a collector, has had three attacks of "rheumatic gout" in his great toes and ankles, and two of iritis in the right eye. He describes the joint attacks as coming on suddenly in the night, and as accompanied by swelling, shining of the skin, redness and severe pain. The first was in one great toe, the fellow toe becoming affected a week later. The second, his worst attack, laid him up for six weeks, and was followed in a short time by the first iritis. It was for the second iritis that I treated him in *April*, 1872; he had then no joint inflammation, nor had he had any for a year. The iritis was accompanied by a good deal of corneal haze. About twelve months after the first attack of "rheumatic gout" he had a urethral discharge; his doctor said it was due to a vaginal discharge after miscarriage in his wife and that it was not gonorrhœal. It may possibly have been spontaneous (arthritic) urethritis.

The patient's sister was laid up for six or seven weeks with "rheumatic fever" when fifteen years old; her joints are stated to have swelled. She has ever since "been troubled with rheumatics," being every now and then obliged to keep her bed from an attack of swelling of joints. A maternal uncle of the patient, a publican, suffers from "rheumatic gout." There is no other known history of joint affections in the family. The patient's mother is living, æt. 70, and said never to have been in the least rheumatic.

CASE XCVI.—*Unsymmetrical Iritis in an Arthritic Patient, at 30—Gonorrhœa followed by Ankylosing Rheumatism of one elbow, at 20; no other joints affected then or since—Gout inherited from his father—Patient's brothers and sisters not Arthritic.*

Charles T., æt. 30, was admitted at the end of *August*, 1872, with slight iritis of his right eye; he had never had it before. There was no reason to suspect syphilis, nor any evidence of it.

His left elbow was completely ankylosed and had been so for about ten years since an attack of "rheumatic gout" in the joint, which followed soon after he had caught a gonorrhœa. He is the eldest of six, all are sons; none, excepting himself, have had rheumatism or gout. His father suffered badly from "gout" in his feet; he was a miller, and died at 42, of "typhoid fever."

When admitted, the patient was also suffering from vesicating erythema (? hydroa) of the ears and hands. On the backs of the hands were a number of wheals, some small and separate, others large, irregular and made up by the confluence of smaller ones; they were permanently white and on many of them there were vesications. There were some similar spots on the anti-helix of each ear and one or two small ones on the lower lip. The vesicles were always much smaller than the wheals.

He stated that his eye began to inflame on *August 13th*, and that on the *19th* he consulted a medical practitioner, who ordered some medicine which he began to take the same evening. After he had taken four doses, the rash began to appear; this was during the night of *20th*; he was woke up by the smarting of the eruption. The vesicles formed afterwards. I have not been able to ascertain the composition of the medicine.

CASE XCVII.—*Iritis in one Eye eighteen months after the loss by injury of the other—Diagnosis between Sympathetic and Arthritic Iritis difficult; the latter rendered probable by the result and the previous history—Strong family history of Gout—Iritis with Corneal Ulcers in a brother.*

George W., æt. 36, had his *left* eye wounded by the ferrule at the end of a stick during the summer of 1869; it is improbable that any foreign body remained in the eye. He suffered from inflammation and much pain in the eye and was under my care for nine months. At first he had some sight in it, but this was quite lost before he ceased attendance. He visited the hospital as long as the lost eye continued painful, and after nine months' attendance it became quiet and remained so. He had never had anything amiss with his eyes before this accident.

He was a very steady man, drinking a little beer daily; spirits he could not take. His incisor teeth were very bad and

he attributed this to his having taken much calomel for "croup," between the ages of five and twelve years.

In *December*, 1870, eighteen months after the accident, he again presented himself with inflammation of the *right* eye; the eye had begun to get "rather painful and inflamed" two or three weeks before, but had suddenly become much worse six days ago. It had been attended by great pain, especially at night. There had been no pain or irritation in the left (injured) eye whatever since his last attendance nine months before, nor was there any when he applied on account of his right eye.

There was, at the above date, well-marked iritis with exclusion of the pupil in the right; great congestion of the ocular and palpebral conjunctiva; steaminess of cornea and a line of slight chemosis around it; extreme tenderness of the globe to pressure; T. normal. Three weeks later indectomy was done in both eyes, with the result, after some weeks, that vision increased, from being able only to count fingers with the right eye, to 6 J. This improvement was gradual but steady, the whole case occupying about six weeks from the date of operation. The injured eye was not improved materially; with it after the operation he could just see shadows.

Three years before the iritis of his right, he was laid up for three months by severe articular rheumatism accompanied by great pain in the joints, but not by much swelling. His father, a man of 70, began to suffer at about 69 from "rheumatic gout" in his hands and feet, and his fingers had become somewhat deformed by it. His father's mother is believed to have had gout badly, and the patient's own mother, now *æt.* 71, has quite lately had "gout" in her feet and hands.

The completeness of the cure of this patient's iritis, together with his own and his father's arthritic history, makes it extremely probable that his attack was of arthritic and not of sympathetic nature.

He was discharged at the end of February, 1871. In *December*, 1872, he again came complaining that the right was getting dimmer; he could see only 12 J. with it; there were no definite symptoms of inflammation, but the eye was watery and he complained of waving *muscæ*. He was suffering at the time from rheumatism in the neck and loins.

Between the patient's visits to the Hospital, in November,

1871, a brother of his, æt. 42, came under my care for increasing failure of sight. I found that he had old corneal opacities and incomplete arcus, in consequence of prolonged marginal ulcers of cornea in childhood, and also iritic adhesions (cyclo-kerato-iritis). He said that his eyes had been very bad for three years at about æt. 7, and weak for several years longer, but that he had had no relapses since then. He was a stout, rather florid man, with brown hair and irides and good teeth, and was, like his brother, partly bald. He had had no rheumatic or gouty symptoms, unless we include as rheumatic an attack of left "pleurisy" many years before, and some years later (nine years before I saw him) occasional attacks of "neuralgia" of the left flank, the pain of which was different from that of the "pleurisy," and was treated by hypodermic injections. He was in the habit of taking a little beer regularly but could not drink either stout or spirits.

CASE XCVIII.—*Relapsing Iritis and slight Rheumatic pains in a Woman of 29, the subject of Tertiary Syphilis—Rheumatic Arthritis and Catarrho-Rheumatic Ophthalmia in her grandmother, who also has Xanthelasma and Hæmorrhagic Retinitis—Rheumatism in grandmother's mother—Tendency to left-sidedness in diseases of the patient and grandmother.*

(The cases of Mrs. B. and Mrs. J., her grandmother, have been published very briefly already, see Nos. LXX and LXXI of this series, vol. vii, p. 482.)

Mrs. B., æt. 29, first had iritis of her left eye in December, 1869. During the next $2\frac{1}{2}$ years she suffered repeated relapses of inflammation in the same eye, recovery (perfect as regards the inflammation) taking place between each attack. During about the same time she had several patches of ulceration on the left side of her scalp, and fresh gummous tumours formed there during her attendance. She had formerly had similar ulcerations on the left thigh.

She states that fourteen years before the iritis, and soon after marriage, at about the age of 15, she had syphilis from her husband. The primary disease was followed by eruption on the skin, sore throat and falling of hair, but not by any affection of the eyes.

This patient considered that she had been liable to "rheumatic pains" for several years, and stated that a short time before her eye inflamed she suffered severe neuralgic pain in the left side of her face. Although her own rheumatic symptoms

were thus slightly marked, her family history furnished abundant evidence of arthritic tendencies.

The patient had not known anything of her father for many years and was not able to give any evidence as to his health. Her father's mother, *Mrs. J.*, a florid stout old woman of 72, with dark hair like the patient's, was laid up for several months at the age of 50, with what she called rheumatism in her ankles, knees and hands. In after years she had numerous attacks of "rheumatic gout" in many small and large joints; she described the great toe joints as being suddenly affected with swelling, redness, and glossiness of skin. This old lady stated that she had frequently had inflammation of her eyes. The attacks were accompanied by intense pain, but neither by impairment of vision, nor discharge; they were of short duration and generally preceded a rheumatic attack in the joints. In early life she was a great sufferer from sick headaches, but they left her at about 40 years of age. She had lived freely, and had drunk beer and port wine.

Mrs. J. herself came under my care early in 1871, for retinitis with very extensive hæmorrhages in the left eye only. The hæmorrhages were very numerous and occurred all over the fundus. The eye had failed about a month before, without pain. She had a single small patch of xanthelasma on her left upper lid close to the inner canthus. With regard to her joints, the articulations of many of her fingers were enlarged and stiffened. The knees were stiff and weak; there were well-marked lips on the femoral condyles, much synovial thickening, and many pedunculated bodies in the knee-joints; the right knee grated distinctly on movement. Her urine contained a large number of hyaline and slightly granular casts of various sizes, but no albumen.

Mrs. J. stated that her mother had formerly suffered from what was called "rheumatism in her shoulders and side, and in her teeth."

Returning to *Mrs. B.* (*Mrs. J.*'s grand-daughter), it seems highly probable that she inherits a tendency to arthritic diseases, and her relapsing iritis and severe neuralgia are most likely early manifestations of it. There seems to be no sufficient reason for thinking that her tertiary syphilis had anything to do with the iritis, for the nature of the iritic attacks, taken in con-

junction with the strong family history of arthritis, would have supplied an efficient cause had the patient not been syphilitic.

With reference to asymmetry in pathological tendencies, it is interesting to note the occurrence on the same side (the left) of iritis and tertiary syphilitic ulcerations in Mrs. B., and of the retinitis hæmorrhagica and xanthelasma in her grandmother.

CASE XCIX.—*Painless Rheumatic Arthritis and Chronic Iritis in an old woman, who (probably) does not inherit the Arthritic Diathesis—Severe Deforming Arthritis in her daughter; her sons not Arthritic.*

Ann E., æt. 73, has had chronic iritis of both eyes for several months; it has been attended by considerable photophobia and a chronic catarrhal state of the conjunctiva has remained after the subsidence of active iritic inflammation. It is her first attack and began in *April*.

She has never had any noticeable rheumatism, but she has distinct lips on her femurs and grating in the knee joints, both conditions being more marked in the right knee.

She has had four children, only one of them being a daughter. Her sons have had, so far as she knows, no arthritic symptoms. The daughter, at about the age of 40 and after having borne several children, began to suffer from rheumatism in her fingers, and now she is said to have many joints affected by the disease. Her knees, ankles, and shoulders have suffered, as well as her hands: the hands are said to be "as thick as two should be."

There is no history of any kind of arthritis in the patient's ancestors. She knew both her own parents, and all her grand parents excepting one, and is certain that none of them had any joint disease of consequence. Her father was a small farmer and drank very moderately of malt liquors. The patient herself has always been obliged, from poverty, to use as little beer as possible, and considers that she "has had less than she ought to have had;" she is a healthy looking old woman and in tolerable vigour for her age.

CASE C.—*Gout in the father—Rheumatic Arthritis and unsymmetrical Iritis with various symptoms of fascial Rheumatism, in a son; severe Arthritis (probably gout and rheumatic arthritis) in a daughter.*

Samuel S., aged 37, had his first attack of iritis in *August*,

1871; it was in his right eye. About 12 years ago he had a prolonged gonorrhœa lasting two years, but denies having had symptoms referable to syphilis. He has often had pain and "stiffness" in his loins, and "stiff-neck;" he used formerly to suffer a good deal from cramps in his legs and sometimes the pain would wake him up at night. The only symptom of articular disease has been aching in the knees, he has often had this but took little notice of it. He now has decided, but small, lips on the condyles of his femurs, and there is effusion into the bursa beneath the ligamentum patellæ in each knee. He had no rheumatic pains when the eye inflamed, nor was the iritis attended by much redness or by severe pain.

The patient is a brush-maker; he is not well off and does not live very well. He has dark hair and a pale face, and says that he resembles his mother.

His father suffered severely from gout and was often laid up by it; he was a stout light-haired man, by occupation a gardener and coachman. The patient is the fifth in a family of seven; the eldest, a sister, is said to have had "rheumatic fever" several times. The last severe attack laid her up for five months, but she still often has transient attacks lasting two or three days. These are chiefly in her feet and are severe enough to lay her up for short periods. She is said to be a stout heavy woman with dark hair; she has been a cook since she was 10 years old, and has always lived well, and these facts in her history make it extremely probable that her attacks of "rheumatism," at least the latter ones, are really attacks of gout. No other relatives known to be arthritic.

CASE CL.—A single severe attack of Arthritis (? gout) in one foot, followed by various slighter Arthritic symptoms—Subsequently, Chronic Iridocyclitis first in one eye, then in the other; Secondary Glaucoma and complete blindness of the eye first affected—History of a fit, followed by Hemiplegia, several years before the other symptoms—The severe Arthritis, lost Eye, and Hemiplegia all on the same side—No hereditary Arthritic history—Possible influence of lead.

William H., aged 42, a coach-painter; he has a pale complexion, blue irides and light brown hair. Two winters ago he

was laid up for two months by pain and great swelling of the left foot. He has besides this attack, often had slight rheumatic pains in his knees, feet, ankles and hands, but with the above exception he says that he has never had to leave off work for more than a few hours on account of the joint affection. The left foot is now well but is rather weak. He has no lips on the femoral condyles.

He comes on account of his eyes, and gives the following account of their failure. About twelve months ago he had an attack of inflammation in both eyes, they were "blood-shot" but not painful. The redness soon disappeared after the application of some leeches, and the right eye soon got quite well and remained so for many months. The left, however, progressively failed, still without pain, until at the end of six months from the commencement of the attack this eye was quite blind. It has remained so ever since. For the last six weeks the right eye, which had recovered, has begun to fail gradually and without pain, just as the left did. *Present condition: Left eye* no perception of light, tension increased, pupil excluded, iris bulged forwards and tremulous at its periphery, sclerotic dusky from congestion. *Right*, pupil excluded, slight ciliary congestion and duskiness of the globe; vision just 2 J. I excised the right eye, and performed iridectomy on the left with the result of improving the sight slightly. (A detailed account of the excised eye has already been published *in vol. vii, p. 377.*)

Although he is a coach-painter and works constantly with colours containing lead, he has never had any of the ordinary symptoms of lead poisoning; I unfortunately omitted to examine his gums with reference to the presence of a blue line. He denies all history of syphilis and of gonorrhœa in a most positive manner, and apparently has every motive for telling the truth. Six years ago he had some kind of "fit;" it was a sudden seizure consisting in loss of consciousness, and was followed by imperfect paralysis of the left side of his body which lasted for a long time. He has never had another fit.

There is no family history of arthritis in his parents or grand-parents, nor in any of his brothers or sisters. He knew both parents and all his grand-parents, except his father's father, whose history he is not sure about. The patient is the third of a family of eleven; five of the number, chiefly the younger ones,

died, for the most part in early infancy. His father died of "decline" at 60; his mother is living and 70 years old. He says that two of his brothers are liable to "scurvy."

CASE CII.—*Iritis in one Eye, subacute and recurring for the first time in a woman at the age of 72—History of several attacks of "Rheumatic Fever" since girlhood—Presence of Lips on Condyle of one Femur—Her children slightly Rheumatic.*

Sarah B., a healthy old woman of 75, with brown irides and dark hair, turning gray, has had iritis of her left eye, subacute in character and leaving synechiæ. The eye inflamed for the first time about three years ago. She also had cataracts in each eye.

She has had three attacks of "rheumatic fever." The first occurred in girlhood, the last about twelve years ago. She was laid up for three months with the last attack, but on that occasion the joints did not swell much. She believes that the doctors never considered her heart to be diseased. There are decided lips on the right external condyle, but doubtful ones on the left.

She says that her children (most of them boys) often have "rheumatics" in their joints, but are not laid up by it. She does not know of any arthritic history in other relatives, nor has any one excepting herself had bad eyes.

CASE CIII.—*Gonorrhœal Rheumatism and Gonorrhœo-Rheumatic Iritis in a patient who had had several attacks of severe Rheumatism before he had Gonorrhœa—Lips on the Femoral Condyles—Rheumatic Fever in a younger brother, and Gout in the father of the patient.*

George P., æt 24, a coachman, was admitted on November 9, 1871, when the following notes were made:—"Looks remarkably healthy; has sandy brown hair, fair complexion and many freckles. He comes with iritis of his right eye. It is of twelve days' duration, and is accompanied by much conjunctival congestion and steaminess of the cornea. There has been great pain from the beginning. He has never had it before."

The patient is highly rheumatic. He has had three attacks of what he calls "rheumatic fever," the first of which laid him up from November to April, and was, as he believes, caused

by his having by chance put on damp clothes a few days before its commencement. The last attack confined him to bed for two months. All these attacks occurred between the ages of about eighteen and twenty, and before he had any gonorrhœa. He had his first gonorrhœa at about twenty, soon after the last attack of "rheumatic fever;" he had no gonorrhœal rheumatism with this gonorrhœa. A year before his admission he again had gonorrhœa, and this time it was accompanied by great swelling of the left foot. His last gonorrhœa was in September, two months before the iritis; it was not followed by rheumatism, unless the iritis may be considered as taking the place of some joint affection. He has decided lips on the condyles of his femurs. There is no reason to think that he has syphilis. Since childhood he has been subject to a dry scaly rash on his arms, legs, chest, and head. He has always drunk beer, and formerly more freely than he now does.

His father, a gamekeeper, aged about fifty, who drinks freely, has lately had "gout" (his doctor's diagnosis) in his great toes two or three times. A younger brother of the patient's had rheumatic fever at twelve years old. None of his grand-parents are, so far as he knows, arthritic, and there is no rheumatism, &c., on his mother's side. He resembles his mother and mother's father.

CASE CIV.—*Kerato-Iritis recurring in one Eye only—Family history of Rheumatism on father's side—No evidence of Syphilis or Gonorrhœa.*

Charles L., æt. 20, spare, with blue eyes and light hair, suffered for the second time from kerato-iritis of his left eye in November, 1872. There was general haze of cornea from steaminess of surface, and, at the lower part, small deposits in its substance. There was a small pink nodule of lymph on the pupillary edge of the iris. There was no evidence of either syphilis or gonorrhœa, although I examined him carefully everywhere; and he very candidly denied ever having been exposed to the risk of contagion.

He has had no arthritic symptoms in his joints or fasciæ at any time, but his father had "rheumatic fever" at the age of 45, and has since then often had rheumatism "in his knees and in his head."

There is no other family history of arthritic complaints, and none of skin diseases.

CASE CV.—*No family history of Arthritis—Exposure to cold during an attack of Gonorrhœa, followed by Rheumatism and Acute Iritis—Numerous attacks of Iritis, subsequently ending in great damage to the Eyes. Iridectomies.*

Wm. W., æt. 56, has been more or less frequently under my observation for ten years past. He was Mr. Dixon's patient in 1859 and 1860, by whom, in the latter year, an artificial pupil was made in the right eye. In 1864 he passed under the care of Mr. Bader at Guy's Hospital, by whom iridectomy was done on both eyes for artificial pupil, both pupils being closed by iritis. At present date (*April, 1871*) his left eye is all but blind, and has been so since the last operations. With it he can see only a glimpse of light when the eye is directed strongly outwards. There has been a relapse of irritation in it during the last few weeks on account of which he now comes under care; there is now recent iritis with discoloured iris; iris in apposition with the cornea; ciliary congestion. This is the first relapse of inflammation in either eye since Mr. Bader's operations. The right still wears well, and with it he can still, by effort, read a newspaper. Both globes are firm.

The patient is a stout muscular man, but his skin has the pallor so often seen in arthritic persons. Thirty years ago, while suffering from gonorrhœa, he was put into a damp bed, after which he had pain in one foot, and, a week later, in the eyes. This was his first attack in joints or eyes. Since then he has had altogether about twenty attacks of recurrent iritis. He has never been laid up by rheumatic fever, but has often had rheumatic pains. He now has large lips on the condyles of both femurs, but no crippling of small joints. Has taken much mercury at different times, but there is no history of syphilis. His appetite is moderate and he has taken beer all his life from boyhood. Has no stricture. No family history of arthritis.

CASE CVI.—*Rheumatic Iritis in left eye of three weeks' duration—Mother crippled by Rheumatism—Frequent attacks of Gout in a paternal uncle—Recovery under use of Quinine and Aconite.*

Miss D., æt. 32, was sent by Mr. Cooke of Stoke

Newington, *May 22, 1873*, with rheumatic iritis of the left eye. Her mother was said to be crippled by rheumatism, and to have had it very severely in the hands. A paternal uncle often suffered from gout. *May 26th*, it is noted, there was a much better pupil. *June 4th* the eye had quite recovered. The treatment had consisted in the internal administration of quinine and aconite (a grain and seven minims). Some giddiness was supposed to have been caused by the aconite. She had had no previous attack.

CASE CVII.—*Gouty Iritis in left Eye—Gout in paternal grandfather—Probably in father.*

Mr. Ernest T., *æt. 17*, was sent by Dr. J. M. Bright, *July 16, 1873*. Both eyes were fully under the influence of atropine. In the left, at the upper edge of the pupil, there was a single tag of adhesion. His grandfather, on the father's side, suffered much from true gout, and the father himself had had repeated attacks of what he thought was gout-pain in the wrists, but never in the great toe. The lad himself had had no arthritis. An elder brother, *æt. 19*, had a bad knee for long, and had inflammation in both eyes. He got rid of the latter when sent to Switzerland two years ago, and has had no relapse. His eyes were examined but no iritic adhesions could be detected.

April 17, 1874, it is noted that he was said to be quite well, and was then in Germany. (See his aunt's case, Mrs. T., Case XCV.)

CASE CVIII.—*Iritis in one Eye—Rheumatic Fever at the age of 12—No history of Gout in the family—Rheumatic Fever in a brother—History of liability to Bilious Attacks, but no other ailment.*

Mrs. M., *æt. 40*, was seen *September 3, 1873*. She had never conceived. She was very bilious and liable to violent vomiting. For a year she had been liable to a darting pain in the left eye with blood-shot appearance, but no loss of sight. The attacks lasted about a week, and passed away spontaneously. When she came under care her right eye was painful for the first time. The eye had begun to inflame three weeks previously without

any known cause. The attack was acute, and she almost lost her sight. The eye was much blood-shot. No iritic adhesions could be detected, but there were a large number of pigment dots near the middle of the lens. She said that at the age of 12 she had rheumatic fever, but had not since then been subject to any rheumatic symptoms. She had never had gout, and no history could be obtained of any gouty symptoms in members of the family. A brother has had rheumatic fever. With the exception of the bilious attacks noted above, she was not aware that she had had any illness since she was a girl.

CASE CIX.—*Iritis in one Eye—History of two previous attacks—Attacks of Gout in a maternal uncle—"Enlarged joints" in the mother—Other maternal relatives "martyrs" to Gout.*

Mr. W. G., æt. 40, sent by Mr. Carter, Chelmsford, September 15, 1873, a brewer. Fourteen years previously he was said to have had an attack of "iritis" (which eye not stated), and another seven years later. He came under care for a third attack in one eye (not stated which) of about a month's duration. He went to bed well, but feeling a little weak, and the attack began suddenly about four in the morning. The eye had not been very painful. "The remedies had been more painful than the disease." A maternal uncle had had gout, and always prophesied that the patient (his nephew) would have it. His mother has suffered from "enlarged joints." Others of his mother's relatives have been "martyrs to gout." He himself was very lame once with pain in the backs of the heels. This was ten years before he came under care, and soon after the attack in his eye. He had never had rheumatic fever, nor any special joint affection, excepting that during the attack of heel-pain his ankles were swollen and he had to have larger boots than usual. His urine was said often to be thick, and he had sometimes noticed "bits of gravel" in it. He had never noticed that any special article of diet had disagreed with him, and had been in the habit of taking port wine and beer in regular moderation.

CASE CX.—*Adhesions resulting from Rheumatic Iritis.*

Mrs. G., æt. 70, came under care October 13, 1873. There were iritic adhesions in both eyes. She had had "rheumatism in

the head" and attacks of rheumatism in various parts for three or four years. The attacks of inflammation of the eyes had extended over two years.

CASE CXI.—*Iritis in one Eye in a patient who had had Rheumatic Fever after Gonorrhœa at the age of 20, and some (?) gouty pain at the age of 17—Complaint of always having Rheumatic pains about him—Remote history of Gout, but none of Rheumatism in the family—Improvement, in one attack, by the use of Aconite.*

Mr. G. was seen with Mr. Savory, of Stoke Newington, in May, 1873, with iritis of the right eye. He got well under use of aconite. He was seen again December 17. He was a florid, healthy-looking man. He had then taken two grains of quinine and four minims of tincture of aconite for three weeks, that is, from the commencement of the fresh attack of iritis. He had had rheumatic pains changing from hip to hip. He complained that he was never well, always irritable and with more or less rheumatic pain about him. He said gout was quite unknown in the family excepting as regards a maternal grandmother who had it in old age. No one was known to have had rheumatic fever. At the age of 17 he had pain in a toe-joint very like gout. At the age of 20 he had rheumatic fever after gonorrhœa. The rheumatic fever left him with various aches for a long time; he was Dr. Fuller's patient. When seen his pupil (left) was fairly dilated, but with adhesions. There was still much congestion of the ciliary region. He could sleep well, but was liable to severe neuralgic attacks in the eye.

CASE CXII.—*A first attack of Iritis in one Eye at the age of 34—History of Gout in a paternal uncle and of Rheumatism in a paternal aunt—Cure in a short time by the use of Atropine and Iodide of Potassium.*

George B., æt. 34, a warehouseman, came to Moorfields, November 6, 1873, with a first attack of iritis, of twelve days' duration. It affected the left eye. The pupil dilated fairly, but with tags of adhesion. He stated that he had never had rheumatic fever or any form of rheumatism, excepting once when it affected

his left hand. He had never had syphilis, but had had gonorrhœa twice; no rheumatism followed the gonorrhœa. Under the use of iodide of potassium internally and atropine drops to the eye, he soon recovered from his attack of iritis. The pupil became quite round, and only the very smallest specks of pigment remained on the lens. Subsequently a few small streaks of opacity were found in the extreme periphery of each lens—a mere rim, almost exactly alike in the two eyes. There was no arcus senilis. His arteries were not tortuous. He had brown hair.

He told us that an uncle (paternal) died of gout in the stomach when more than sixty years of age. An aunt (paternal) who was living, was reported to suffer from rheumatism, and was confined to bed by paralysis. His father died at the age of 34, of “typhus fever.” His mother died young. He had no brothers or sisters.

CASE CXIII.—*Insidious Iritis with Vitreous Opacities—No reason for suspecting Syphilis—A sister crippled with Rheumatic Gout.*

Mrs. H., æt. 49, was seen with Mr. Blewitt, *January 22nd, 1874.* She had been aware that the left eye was failing for a year or more. She often had an aching pain at the backs of the eyes; more so on the left side than on the right. In the right eye there was a single iritic adhesion, some specks on the lens, the lens hazy and large, and numerous films in the vitreous. The left lens was a little hazy. She had lost her husband in September, of phthisis. She had no family. There was no reason for suspecting syphilis. She sometimes had pain in the left arm, so that she would lose all power. There was no history of gout in the family to be obtained. A sister had been crippled for nine years with rheumatism and could scarcely walk. She herself had never had any definite rheumatism. She was a fair complexioned, florid, rather delicate looking woman.

April 1st, it is noted, that she had “a good deal of rheumatism” in the left hand and arm. It leaves her “powerless.” In bed she usually keeps the left arm outside, because it gets so painful when hot. She has had some slight pain in the other. If she walks much she does not perspire, but gets hot and faint.

The rheumatism in the lower extremity (as in the upper) is worse on the left side. She generally sleeps badly. She enjoys her food. The tongue is quite clean. The eye is in much the same condition as before. After she had taken perchloride of iron for some time she was better in all respects. There was no relapse as regards the eye. On *August 28th* she was very much better, in fact almost well. The steel had been taken regularly. There had been no relapse, but she had occasionally had pain in the back of the neck. On *November 20th*, it is noted, that she was much better in all respects. She had not taken any remedy for some time.

CASE CXIV.—*Gouty Iritis (first attack) at the age of 62—A nephew also the subject of Gouty Iritis.*

Mrs. T., æt. 62, sent by Dr. Bright, *April 16, 1874*. (See her nephew, Master T.'s case CVII.) She was suffering from iritis of two week's duration. There was no history of gout or rheumatism. Her mother was alive, aged 87. She herself had always had excellent health. The first symptom noticed was a feeling as if grit were in the eye. The eye seemed easier when exposed to cold air. She could barely see to count fingers. For a year she had been liable to attacks of profuse lachrymation, so that the tears would fall as if in crying very freely. The attacks would last five minutes, and would occur once a week. She could assign no cause for them. She had been in the habit of taking port wine and malt liquors.

CASE CXV.—*Iritis in one Eye in a Woman aged 57, whose father and brother had suffered severely from true Gout.*

Mrs. P., aged 57, came on *May 17th, 1874*, with an attack of iritis in the right eye. The iris was scarcely muddy, and it acted well under atropine, but showed many adhesions. She had never had an attack before. It began ten days previously, and the eye had been very painful. The disc was normal. She stated that her father was a "martyr" to chalk-gout. He lived to the age of 67, and died of paralysis. His father had asthma, but no gout. One of her brothers (the only one living) was suffering from gout at the time she came under care. Both of

them drank freely, especially port wine. She had herself taken stout all her life. She had never had any form of rheumatism, excepting an attack, of three or four weeks' duration, in the shoulders and arms, and occasional lumbago. None of her joints had ever been affected.

CASE CXVI.—*Iritis in a young Man who had had Syphilis some time previously, but who had had Rheumatic Fever, and whose father was laid up with Rheumatic Gout.*

Mr. B., æt. 23, of dark complexion, came under care, *June 1st, 1874*. He had married in the previous November. He had had a chancre three or four years previously, and had had sores several times. He had iritis at *Christmas, 1873*. He believes he never had any rash, but he had sore mouth. The date of the real inoculation was uncertain. The left pupil was excluded and there was a thin membrane covering the greater part of it. It was doubtful whether the iritis was syphilitic or rheumatic. He had had two attacks. His father was laid up with rheumatic gout (or chronic rheumatism), and was quite crippled. He had himself had rheumatic fever three years previously. With the left eye he could read $\frac{1}{2}\frac{5}{6}$. The eye was steadily improving. He was liable to herpes on the penis. On the whole, the iritis was considered to be more likely to be rheumatic than syphilitic.

CASE CXVII.—*Gonorrhœo-Rheumatic Iritis—Five attacks of Rheumatic Fever, the first, following on an attack of Gonorrhœa and associated with Inflammation of the Eyes, at the age of 21—No special Rheumatic tendency in family.*

Mr. W., æt. 55, a publican, came under care, *November 7th, 1874*, for an attack of iritis in the left eye, of seven or eight weeks' duration. He had had two attacks previously in the same eye, and one in the right eye. The pupil of the right eye was freely moveable when he came under care, that of the left was adherent all round, and there was considerable conjunctival and ciliary congestion. The history he gave was, that he had had five attacks of rheumatic fever since the age of 21, when his first attack occurred, while suffering from gonorrhœa, and after exposure to cold and wet. His left eye was inflamed at the

same time. His second rheumatic attack was five years after the first. His third six years later. His fourth five years after the third; and the last four years later. Four years after the last attack of rheumatic fever, his left eye was inflamed a second time. Eight years after that (two years before he came under care) he had an attack of inflammation in the right eye. His relations had not suffered especially from rheumatism, but his father used to complain of rheumatic pains. The patient has eleven children, and none of them have suffered excepting his eldest son, who has had a good deal of rheumatism. He has no brothers or sisters. He has been a "martyr to bile." He never has sick headaches, but has frequent attacks of "stomach cough." His shoulders were both stiff, and could only be lifted slightly. He never thought that diet made much difference to him. He had taken beer freely and wine moderately. Gin and water always suited him best. Moist, foggy weather suited him very well, but not cold, clear weather. Five years previously he had had a severe attack of neuralgia, affecting both sides of the head; the pain was terrible and lasted six weeks. Twenty-five years previously he had an attack of lumbago. He said he was scarcely ever an hour free from pain of some sort, excepting when asleep.

A GROUP OF CASES OF SEVERE IRITIS IN YOUNG CHILDREN
ABOVE THE AGE OF INFANCY.

By JONATHAN HUTCHINSON.

The five cases recorded below have occurred in my practice at Moorfields at considerable intervals during the last nine or ten years; they include all of which I have notes, excluding the iritis which occurs definitely in the secondary stage of inherited syphilis, and the iritic complication which often takes place in association with interstitial keratitis.

The first four cases resemble one another in several particulars; Case V, in which there was perforating ulceration of both corneæ, is more doubtfully related to the others; it is, however, a very unusual case and may for the present be included with them.

The following are some of the points in regard to which the first four of the cases may be compared with each other:

Asymmetry.—In each of the four cases only one eye was affected; the R. only in three cases, the L. only in the remaining one.

Character of the Disease.—In all four the iritis was plastic, resulting in the formation of much new tissue in the iris, either with or without nodular growths from its surface. In three of the four there was steaminess or slight ulceration of the cornea during some part of the case; in the fourth the state of the cornea is not noted. In the two worst cases (I and II) it is especially noted that there was scarcely any pain or intolerance of light. The degree of ciliary congestion was, as a rule, very moderate, and less than might have been expected from the extensive changes going on within.

Result.—In two of the four (cases I and II) the eye was

quite disorganised and had to be excised ; in case III the eye was probably destroyed for practical purposes. Case IV was seen only once and the result is unknown.

Sex.—All of the four cases were in girls. It may be noted here that the majority of cases of iritis in the secondary stage of inherited syphilis occur in girls.*

Age.—The age at which the disease began varied from about 15 months (case III) to 6 years (case I).

Hereditary Syphilis.—In case I, an elder sister of the patient is undoubtedly syphilitic, having had severe interstitial keratitis, and at an unusually early age. In case II it is very probable, but not certain, that the child is tainted with syphilis. In cases III and IV no enquiries were made.

Other Diseases.—It was stated that the father of the child in case II had lately died, æt. 36, of “consumption,” and that the mother in case III also died of the same disease.

CASE I.—*Disorganising Iritis, with Nodules of Lymph which afterwards suppurated, in one Eye of a Girl, æt. 6. Other Eye not affected. Syphilitic (Interstitial) Keratitis in an elder Sister.*

Kate J., æt. 6 years, a fair-haired, rather delicate-looking child, was sent to me by Dr. Bentham, of Southsea, on March 26, 1874. She had severe iritis of the right eye, accompanied by nodules of lymph of reddish colour and with numerous vessels at their bases ; one or two of the nodules were yellow at their apices, as if containing pus. The iris was very much disorganised and the cornea steamy, but there was very little pain or intolerance of light, and only moderate ciliary congestion.

At the first visit I did not succeed in making out anything as to the cause of this very peculiar form of iritis. There seemed no reason to suspect either acquired or inherited syphilis. The treatment adopted consisted of atropine, a blister and small doses of iodide of potassium. The inflammation, however, progressed, and the nodules on the iris subsequently suppurated,

* See p. 18 of my work on *Diseases of the Eye and Ear consequent on Inherited Syphilis*.

burst and discharged puriform matter into the anterior chamber. Still, however, no pain was complained of, but as the eye was evidently lost, I advised its removal, and excised it on *May 18*.

At this date, an elder sister, the second in the family, was also brought with dense cloudy opacities and a general steamy condition of her left cornea, typical interstitial keratitis in fact; her teeth and physiognomy, however, showed nothing to corroborate the suspicion of hereditary syphilis, but there was the history of a previous attack of keratitis at between 3 and 4 years of age. The eldest in the family, and two others whom I did not see, were reported never to have had inflamed eyes, and there was no history of suspicious infantile symptoms in any of the children. Thus in a family of five children, none of whom appear to have suffered in infancy from syphilitic symptoms, one suffered at an unusually early age from interstitial keratitis, which relapsed in one eye some years later, while a younger child lost an eye from a very rare form of severe iritis. It must be observed, however, that the iritis in our patient did not come on until long after the usual period at which secondary iritis occurs in inherited syphilis, and that the form of disease was very peculiar.

CASE II.—Disorganising plastic Irido-Cyclitis of one Eye in a Girl, æt. 2½ years, perhaps the subject of inherited Syphilis. Excision of the Eye and Microscopical Examination. Very marked changes in Iris, Ciliary Body and Vitreous; the Ciliary Muscle remaining perfectly free from change. Cornea scarcely affected.

Margaret E. Z. was brought to Mr. Hutchinson at Moorfields, on *April 15, 1872*, when the diagnosis of “vascular ulceration of left cornea with iritis” was made.

She was a healthy-looking child, æt. $2\frac{1}{4}$ years, and her mother considered that she had always had good health, with the exception of some snuffles soon after birth and a slight eruption (probably, from the description, red-gum) at the age of three or four months.

There was a suspicious history as to syphilis in some of the pregnancies; the mother, however, denied all knowledge of

venereal disease in herself, and stated that her husband, who had died a year before of "consumption," æt. 36, had been a very steady man. The mother had been pregnant five times.

1. (*f.*) living, æt. 8 years. This child was afterwards brought at request and showed no signs of hereditary syphilis in teeth or elsewhere.

2. }
3. } Both miscarriages.

4 (*m.*) Died, æt. 6 weeks. Was very thin and had snuffles and thrush, but no rash.

5. The patient.

Thus the family history affords some ground for the suspicion of syphilis having been introduced between the first and second pregnancies.

Atropine and one grain doses of iodide of potassium were ordered.

On *May* 6, "iris very vascular, and probably in contact with cornea." Mercury and chalk, in one grain doses, to be taken every night, and to continue the iodide and the atropine.

On *May* 16, it was observed that there appeared to be slight bulging in the ciliary region. A month later (*June* 12) the iris was still very vascular and pushed forwards; there was considerable congestion of the globe and some redness of the lids, the latter due to the child's rubbing them. There was no material photophobia at any time.

The eye being evidently lost, and the symptoms getting worse, Mr. Hutchinson excised it on *June* 13, and she was discharged on the 14th.

The eye was examined by Mr. Nettleship, and the following is his report:—

It was noted after excision that there were "numerous very large and tortuous veins on the iris." The eye was hardened in Müller's fluid until *October*, 9, 1872, when the sclerotic was moderately firm and an equatorial section was made. *Vitreous*, converted into a semi-opaque, brittle, soft gelatinous substance, much the consistence of calves'-feet jelly. Near its centre a string or line extended from the fundus, probably from the O. D., forwards, and spreads out into a cone whose base was attached at the *ora serrata*. This cone did not differ from the rest, except in being rather firmer. The remainder was easily removed by

brushing, washing, and forceps. The greater part of the vitreous was nearly structureless, showing only a moderate sprinkling of round or multipolar inflammatory cells. At the central part, not far from the O. D., however, the "string" mentioned consisted of, or was surrounded by, masses of cells. Most of these were round, some, however, were beautifully spindle-shaped, and there were all stages between these extremes. All showed a large nucleus. In a rough examination it seemed as if the spindle-cells were arranged along the central part of the string and the round ones near to it. *Outer surface of hyaloid* examined not far from the O. D., and showed a moderate number of round cells (somewhat larger than pus), and many patches of highly refracting coagulated albuminous substance. *Ciliary body and iris*, much thickened and yellowish.

No further examination was made at this date, and its completion was deferred till May, 1875, when the front of the eye was further hardened in spirit and carefully examined in thin sections.

It was found that the disease was mainly a plastic iridocyclitis or cyclo-iritis, involving the whole of the iris and the entire ciliary body, *excepting the ciliary muscle*. The *pars ciliaris retinae*, and the *Zonule of Zinn*, and *suspensory ligament of the lens*, were also implicated in the inflammatory action, while numerous corpuscles were present in the adjoining part of the vitreous, whence they passed in streams or parallel lines to the back of the lens. There were changes in the lens which will be mentioned again.

The whole *iris*, and the *ciliary processes*, were enormously thickened, and converted into a more or less round-celled granulation-like structure. The cells throughout these parts, and also in the ciliary retina, adjacent vitreous, &c., being rather small and round, or oval. There was little if any development into spindle-cells or fibrous tissue; but, on the other hand, no appearance of fatty degeneration nor of suppuration. The cells were closely packed, but not everywhere in contact, being imbedded in an ill-defined granular matrix among the remains of the normal structures of the parts. The inner boundary of the ciliary processes was sometimes destroyed and its pigmented epithelium scattered by the intruding cells; in other parts it was more or less well preserved, the processes being even in such

parts, however, much enlarged, and filled almost to bursting. Further back, in the *pars plana*, there were some circumscribed collections of inflammatory corpuscles forming minute spherical tumours, which, partly imbedded in the stroma of the ciliary body, projected also, more or less, into or through its pigment epithelium. A neighbouring blood-vessel, of considerable size, was narrowed by the pressure of one of these growths. I could not detect any aperture in the elastic lamina at the seat of these nodules; this membrane, in the section which showed it best, and which showed every appearance of having passed through the centre of the nodule, was continued across the middle of the little tumour without any perceptible breach of continuity. The front part of the *choroid* was included in many sections; it was not involved in the change, being neither oedematous, nor infiltrated with cells, nor atrophied. The *iris* was for the most part almost in contact with the cornea, in parts quite touching it, a shallow, irregular anterior chamber alone remaining and being occupied by coagulated albuminous fluid. The pupil, which was small, was completely covered in by a thick fibrous membrane, with nuclei in the fibres or fibre-cells; development would appear to have gone further here than anywhere else. In one place a small cyst had been formed in the posterior layers of the iris between its uveal (epithelial) layer which adhered to the lens, and the proper structure of the iris which had here been pushed forward by the effusion of fluid. The cavity of the cyst was subdivided by two or three pillars or bands of highly pigmented uveal cells, which passed obliquely from back to front. Although the iris appeared in life to be very vascular, only a few vessels were seen in the sections; there was, however, much general staining of some parts of it with blood-colouring matter. As has been observed, the *ciliary muscle* was free from cell infiltration, with the exception of a very few scattered corpuscles in its deepest (choroidal) layer. The abruptness with which the inflammatory changes were limited to the tissue of the ciliary processes, and the sudden disappearance of the crowded corpuscles as soon as the inner surface of the ciliary muscle is reached, are very remarkable; the inner boundary of the muscle was thus marked out with far greater distinctness than in health. The tissue of the muscle appeared healthy, but its fibre-bundles were straighter than usual, as if

they had been stretched, which was probably the case, owing to the great increase in size of the parts immediately beneath. With the exception of a very small spot of cell-infiltration close to Schlemm's canal, the *cornea* and *sclerotic* were also free from change. The anterior epithelium of the cornea was thin and somewhat irregular, and the posterior epithelium showed signs of proliferative increase in some parts, but to no great extent, while it was also covered with the spherical and oval myeline-like globules so commonly found in inflamed eyes which have been preserved in Müller's fluid.

The *retina*, immediately behind the *ora serrata*, was separated by a thin layer of clear (coagulated) albuminous fluid from the choroid; it was somewhat thickened and folded; its tissues throughout dim and ill-defined, the rods and cones degenerated into globules. The *hyaloid* covering this part of the retina was much thickened and contained abundant corpuscles and myeline-like globules. These changes increased in intensity in the outer layer of the vitreous in front of the *ora serrata*, and in the suspensory ligament of the lens and *pars ciliaris retinæ*.

Between the fibres of the *suspensory ligament*, and in the most anterior layers of the *vitreous* immediately behind the lens, the cells and globules were arranged rudely into lines more or less parallel with the back of the lens, and gave the impression of streams of cells passing from all parts of the circumference at this part inwards towards the axis of the eye. This tendency is often shown in diseased eyes under various forms, notably in cases where, after long-standing slow inflammatory changes, a more or less complete diaphragm of fibrous or even bony tissue is thrown across the vitreous chamber immediately behind the lens.

The changes in the *lens* were first, its separation by a considerable distance from the ciliary processes, by the inflammatory products, while its size was much diminished and its shape much altered. Its posterior surface was almost flat, the curvature of the anterior surface being unaltered; thus, its thickness was much lessened. Its diameter at the equator was little if at all diminished, and the space between the lens and the ciliary processes was gained by general bulging in the ciliary region (see notes during life), aided by displacement of the lens backwards. There were, secondly, changes in its structure; its capsule

was much thickened, and there was some puckering at the equator and for some distance behind it, *i.e.*, just where the changes in the suspensory ligament and vitreous were greatest. The layer of fibres immediately beneath the anterior capsule was converted into or replaced by a laminated fibrous-looking tissue; this on one side extended quite up to and slightly beyond the equator, where it spread out into a coarse mesh-work, apparently composed of branching fibre-cells which contained round faintly granular nuclei; these fibres were separated by clear coagulated albuminous fluid, which extended quite round the lens at the equator. The hindermost layers of lens fibres were much broken up and replaced by myeline-like globules and masses; the bulk of the lens-substance was healthy.

Remarks.—There can be no doubt that the disease in this case began in the iris or ciliary processes (probably in the iris), whence it spread backwards and inwards towards the ora serrata and into the vitreous. In respect to the vitreous, it is noteworthy that the principal changes occurred in the part immediately within the ciliary body and behind the lens, and in the axial part extending from the posterior pole of the lens to the optic disc, *i.e.*, in the position of the central (arterial) canal. This fact is of interest as illustrating the direction taken in all probability by the nutritive currents of the vitreous and posterior layers of the lens in health.

The complete freedom of the cornea and ciliary muscle from disease is also remarkable in the presence of such very advanced changes in the iris and ciliary processes; and it will here be observed that the inflammatory changes were bounded by the posterior continuations of Descemet's membrane and the inner face of the ciliary muscle, a plane of tissues which may perhaps offer considerable resistance to the outward passage of inflammatory products. It may be compared with the case of Miss T., p. 227, in which inflammation of the uveal tract began at a point rather behind the choroidal attachment of the ciliary muscle, and crept forwards in its tissue, particularly in its outer (scleral) part, as far as the canal of Schlemm, and from thence was beginning to invade the cornea, although the ciliary processes and iris were affected to an incomparably less degree than in the present instance.

As regards cause nothing was proved. It appeared rather

more probable than not that the child inherited a syphilitic taint; but if this were the case the iritis occurred at a much later stage of the disease than usual, and produced changes unlike those usually seen in the iritis of the secondary stage of inherited syphilis. The disease of the eye took place at a time when condylomata occasionally form at the anus as late secondary manifestations.

CASE III.—*A single Vascular Nodule, of large size, on Iris, accompanied by general Iritis of the same Eye, in a Girl æt. 18 months. Gradual diminution of the Nodule, but the Pupil remaining occluded. Other Eye not affected. No diagnosis of cause.*

Mary Anne D., æt. 18 months, was brought to me on May 15, 1871, with a growth on her right iris. It was as large as a split pea, somewhat lobulated, of a light pink colour, and showed several distinct vessels of considerable size on its surface. The friends stated that the growth had been first noticed about three months before, and that it had been at one time much larger than when I first saw it. The child was the youngest of three, all girls; the two elder ones were reported to be healthy. The question of syphilis could not be gone into as the mother was dead (of phthisis), and the father did not attend.

On May 25th, there was slight general haze of the cornea and a small central ulcer; the iris was discoloured and greenish (the other being blue), and the sclerotic and conjunctiva were slightly congested. At this date my colleague, Mr. Hulke, was kind enough to see the case with me, and discussed the question of the growth being a syphilitic gummous tumour; nothing further was proved in this direction, but we determined to try the effect of iodide of potassium, which was accordingly ordered in one grain doses three times daily, with a little sal-volatile. A month later (June 26) there was no change, but the pupil was partly dilated and oval (no doubt from the use of atropine, though this is not stated in the notes).

On April 18, 1872 (nearly a year after admission), the growth was rather smaller, but the evidence of iritis had increased, the pupil being both excluded and occluded. The eye was stated to become frequently very red, but was not so when seen. The medicine had been discontinued for some months. It

was ordered again, but the child did not again attend, and I have failed to trace her since the above date.

CASE IV.—*Iritis, severe, and unsymmetrical, in a Girl of 5.*

Emma H., æt. 5 years, was admitted on *May 28, 1866*. In this case my notes are extremely short, and I have no record of the case after the first visit. It was stated that something had been noticed amiss with the right eye for about a week, and that a few days later (three days before admission) she had begun to be ill, with vomiting and pains in the head. When I saw her, the iris of the right eye was swollen; there were adhesions to the lens-capsule and a rim of gray lymph was present just behind the pupillary margin.

CASE V.—*Perforating Ulceration and Purulent Infiltration of both Corneæ, with Lymph in Anterior Chamber, and severe Iritis, in a Boy of 8. One Eye probably lost, the other much damaged.*

George G., æt. 8 years, was under care in 1871-72 for ulceration of each cornea, with severe disorganising iritis. The notes are unfortunately imperfect and nothing is recorded as to the previous history of the case, or the probable cause of the symptoms:

On *Nov. 20, 1871*, it was noted that the right cornea had perforated, and that its tissue was infiltrated with purulent deposit.

On *Dec. 22*, iridectomy was attempted, but the iris was so adherent that none could be removed. Some opaque masses of lymph, which had previously been adherent to the back of the cornea, were, however, loose, and escaped when the incision was made. On *25th*, it is stated that both irides were disorganised, and showed numerous large vessels. The last note is on *Jan. 11, 1872*. The right eye was then soft, the iris much changed in texture and probably in contact with the cornea, and the eye probably lost. In the left there were still some punctate deposits on the back of the cornea and a central opacity; the anterior chamber was of good depth. I have seen nothing of the child since his discharge on *February 2*.

EXCISION OF EYE FOR SUSPECTED INTRA-OCULAR TUMOUR
(DETACHMENT OF RETINA) IN A GIRL OF 9. CHRONIC
CYCLITIS NEAR ORA SERRATA WITH VASCULAR AND
FIBROUS GROWTHS INTO VITREOUS, PRODUCING DETACH-
MENT OF RETINA BY CONTRACTION. EARLY STAGE OF
INFLAMMATORY PROCESS IN ANTERIOR PART OF CILIARY
BODY AND IN IRIS; RELATION SHOWN IN THESE PARTS
BETWEEN BLOOD-SUPPLY AND DEGREE OF INFLAMMA-
TORY CHANGE.

By JONATHAN HUTCHINSON.

Miss T., æt. 9, was brought to me in January, 1875, for advice as to her left eye. She was quite blind of this eye (having no perception of light with it), but it was not, nor had it been, inflamed or painful, nor was there any history of the duration of its blindness. On examination the retina was found to be detached, but no further details could be established. There was no history of injury, and in the absence of any obvious cause I advised excision as a precautionary measure.

The operation was done on *January* 29, 1875. There was no sign of malignant disease in the cut end of the optic nerve, but I opened the eye at once, so as to ascertain whether, from the presence of a tumour within the globe, there was any possibility of the nerve being even slightly affected. The *retina* was found to be detached in umbrella fashion and almost or quite transparent. The vitreous, considerably diminished in quantity, was clear, but a great part of its outer surface was streaked with fine lines, or thin, wide bands of tough, glistening tissue having a tendinous or scar-like appearance. Towards the front of the eye these tough strings became continuous with an ill-defined white mass, as large as a small bean, attached by a broad base to the retina in front of the *ora*

serrata. This mass (or rather masses, for it was composed of several partly separate portions) occupied about half the circumference of the eye in the *ora serrata* region, and was attached to and blended with the ciliary retina and the vitreous, while the detached umbrella retina was partly in contact with it. The appearances were suggestive of slow inflammatory change rather than malignant growth. A subsequent more careful examination was made by Mr. Nettleship both before and after the specimen had been hardened. He reports as follows:—"Examination failed to discover any foreign body. The largest part of the mass described above had a slightly yellowish tint in its centre, and without much difficulty this portion could be separated from the rest as an ill-defined roundish body. It was thought possible that this might be or contain a degenerated cysticercus, but careful examination failed to detect any trace of one, the mass being entirely made up of inflammatory corpuscular elements. The lens was transparent. The other parts, choroid, sclerotic, and cornea, appeared healthy to the naked eye. In the manipulation most of the tough threads and bands on the vitreous were cut away, and the sections subsequently made included, besides the tunics of the eyeball, only the whitish growth and the more central adjoining part of the vitreous. The specimen having been hardened in spirit, sections were made, including the cornea, sclerotic, and parts internal to these. The lens, during removal, brought away with it a quantity of pigment from the back of the iris, the result of iritis, as subsequent examination showed.

It should have been mentioned that no scar or other sign of past injury could be found anywhere.

Examination of the thin sections showed that the changes had resulted from inflammation of the anterior part of the uveal tract, and especially of the *pars plana* of the *ciliary body* with its underlying *ciliary retina*, whence the morbid action had extended to the neighbouring vitreous and produced the ill-defined masses or growths already described.

The morbid tissue elements varied slightly according to their situation. The growth in the vitreous consisted chiefly of round corpuscles of rather large size and containing large nuclei; in some parts development into spindle-cells and fibrous tissue was going on, this being chiefly in the parts furthest from the ciliary body and therefore presumably of greatest age. The growth contained some thin walled blood vessels near its centre, but no connexion was seen between them and the vessels of the ciliary body. In the ciliary body and iris the corpuscles were for the most part smaller, about as large as the nuclei of the large vitreous cells above described, and about the size of white blood cells. They occurred in greater or less abundance throughout the whole ciliary body (including ciliary muscle) and iris, but were excessively abundant in certain spots. Thus in the hinder part of the ciliary body, posterior to the ciliary muscle, they were so numerous as almost to hide the proper structure, and this condition was present as far back as the section extended, *i.e.*, nearly to the *ora serrata*, and probably further; it was just at this part that the chief disease of the vitreous occurred. Another, but much smaller focus of inflammation was present at the junction of iris and ciliary processes and around Schlemm's canal; while a third existed close to the pupillary border of the iris, its most vascular part. Between these three foci the corpuscular elements were scattered in greater or less abundance; in the *ciliary muscle* they were rather more numerous among the bundles of fibres forming its outer (scleral) surface than in its deeper parts; and they again appeared more thickly studded just beneath the pigment epithelium of the ciliary body, the intermediate tissue of ciliary process and muscle being somewhat less affected. From the region of Schlemm's canal the cells were beginning to intrude into the deep layers of the cornea.

In this case a chronic inflammatory process began probably near the *ora serrata*, posterior to the ciliary muscle; it affected chiefly the neighbouring vitreous, where it resulted in the formation of partly vascularised embryonic tissue in

large quantity ; the inflammatory action, however, spread in a slighter degree to the whole uveal tract in front of this part, apparently rather preferring the looser tissue of the outer surface of the ciliary muscle and the tissue immediately beneath the pigment epithelium of the ciliary processes. It was concentrated in front chiefly in the very vascular regions of Schlemm's canal and the inner circle of the iris.

The anatomical condition of things in this case may be instructively compared with that found in the case of Margaret Z. (case II, preceding series). In the latter the stress of the morbid action had fallen on the ciliary processes and iris, which were enormously thickened ; the vitreous was invaded, but from a different part and with a different result, while the ciliary muscle and front part of the choroid were quite free from disease.

SYMMETRICAL CENTRAL CHOROIDO-RETINAL DISEASE
OCCURRING IN SENILE PERSONS.

By JONATHAN HUTCHINSON.

The following cases belong to a group of which several instances have been under care of late, chiefly in elderly people, and in which the choroid becomes speckled with minute dots of yellowish white deposit. Most of these spots are round, and they occur chiefly in the neighbourhood of the disc, although a few single ones may be seen near the equator. They are comparatively inconspicuous, not being attended by any disturbance of pigment and being usually of very small size. In some instances they are arranged in groups and sometimes become confluent over a considerable area. They appear to affect, for the most part, the choroid only, and nothing special is to be noted in the disc, excepting perhaps slight pallor.

It appears very difficult to suggest any constitutional cause. There is no reason for suspecting syphilis and the patients appear to be in good health.

With regard to the precise seat and nature of these spots, I have no further information than that gathered from ophthalmoscopic examination. There is no doubt that the disease is confined to the choroid in the first instance, while the great defect of sight which accompanies it points to implication of the retina secondarily. In the late stages there appears to be more or less atrophy of choroidal tissue and production of some pigment. Both from the appearance of the spots and the serious defect of sight which occurs, it is probable that the changes take place in the superficial structures of the choroid, and it may be suggested as not improbable, that the small round white spots are

allied in seat and structure to the so-called "colloid" excrescences from the *lamina elastica*. These little bodies are said to be common in old age in eyes otherwise healthy, but are then found near the ora serrata; they are also very often found in eyeballs which have been long blind, and in which inflammation of the deep structures of the globe has occurred, and in such cases they are not confined to any special part of the eye. It may be remarked that in the region affected by the disease under consideration, the blood-supply to the choroid is somewhat peculiar, the short posterior ciliary arteries entering the eyeball in this region, while there are no emergent veins corresponding to them.

Attention may be directed to the following chief points in the clinical history of the disease:—

1. Limitation of the disease to the region of yellow spot and disc.

2. The disc itself almost healthy.

3. Retinal vessels not reduced in size.

4. No accumulation of black choroidal pigment, but blue-black pigment deposits sometimes remain at the yellow spot, probably the results of hæmorrhage.

5. Both eyes affected and in remarkably similar conditions.

6. The choroid in the periphery quite healthy.

7. All the patients past middle life and for the most part in good health. Slight deafness, incipient opacities of the lens, and symptoms of failure or senile disease of the nervous system are noted in several.

The disease appears to go through stages:—

- 1st. Scattered very minute yellow-white spots of deposit in the choroid around the disc; sometimes in groups.

- 2nd. Coalescence of these minute spots and the formation of patches with irregular borders.

- 3rd. Hæmorrhage at the yellow spot and absorption of the blood. It is not certain at what period this occurs.

Cases I, II, and III of the following occurred in three sisters, in each of whom a symmetrical disease of the choroid

around the disc and yellow spot occurred after middle life. The extent and character of the disease were almost precisely alike in the three patients. Two of them had at former times suffered from weakness of one or more limbs apparently amounting for a time to paralysis, slowly passing off, and leaving some permanent weakness. Their family history is given after Case III.

CASE I.—*Symmetrical Disease of Choroids in central part of Fundus in a Woman of 57—Interval of $2\frac{1}{2}$ years between the two Eyes—History of Sudden Onset in Eye first affected—? Hæmorrhage—Slight deafness.*

(Notes by Mr. Waren Tay.)

Ellen G., æt. 60 (the eldest of the three sisters) stated that one day, rather suddenly, three years ago, she found that she could not see well with the left eye. She was busy ironing and was obliged to give it up as a cloud was before her sight. After this she had a good deal of pain, "pricking and shooting," and "hot pain." It was worse at night and often kept her awake. She had no pain elsewhere. She never had rheumatism. It was not until six months before coming under care that her right eye began to suffer. She had had just the same sort of pain in it, but it had not yet advanced nearly so far as in the left. She was rather stout and looked well. She had had good health through life with the exception of two attacks of "fever." The first was a "low fever" after a confinement, and the last an attack of "typhoid," two years before coming under care (a year, therefore, after her first eye failed). She considered that her hearing had failed a little since her eyes had been affected, but she was not deaf to any material degree. With the right eye (her better one) and with a + glass she only saw the letters of 20 J. She was born in the country and was accustomed to field work.

Ophthalmoscopic Examination.—In the left eye there was extensive disorganisation of the choroid in the region of the yellow spot and of the optic disc. At other parts the structures seemed quite healthy. The disc was of good colour and its vessels of good size. At the yellow spot, there was a large irregularly star-shaped, or rather windmill-sail-like, blot of bluish pigment, probably the remains of blood-clot, and adjoining

it were some stained fringes from which the colouring matter had not been wholly removed. There were a few other isolated spots of pigment of the same character at other parts. The aggressive edge of the patch external to the yellow spot was very abrupt and definite. It showed a number of jags and crescents like the irregular border of a serpiginous ulcer. It was white and there was no disturbance of the choroidal pigment. Very similar, but less advanced, conditions were found in the right eye.

The pigment bears but a small proportion to the whole area of disease, the prevalent change being more or less complete thinning of the choroid; the atrophy is nowhere so complete as to leave bare sclerotic.

Since her first attendance she has failed in health considerably; become feeble, and vacant, and her memory has become very bad. These changes came on rapidly in one day, and she seems to have been from the first partly demented. She has had no fit and no paralysis.

Her sight is now (*Aug.*, 1875) just the same as when she first came in *April*, 1874, and the ophthalmoscopic appearances agree with the description then given.

The urine was tested at her first admission and found free from albumen.

She has had ten children; seven were either still-born or died in a few days; three are living and reported healthy and with good sight. Her youngest was born about fourteen years ago.

CASE II.—Symmetrical Disease of Choroid and Retina in central parts of the Fundus in a Woman æt. 48, and in association with Temporary Partial Paralysis of all the Limbs—All the symptoms coming on during prolonged anxiety and at about the time when Menstruation ceased.

(Notes by Mr. Waren Tay.)

Anne J., æt. 50, a widow, the second sister, stated that two years before she came under care she lost the use of her limbs. One day when she got up she found that she could not see with her right eye. She could not see to cut out a dress. She tried first one eye and then the other. The left eye had only been known to fail for six months, and since the loss of her

husband whom she had nursed for a year-and-a-half before his death. She was then laid up in bed for four or five weeks, unable to dress or undress herself; her joints were weak, and she could not lift hand or foot. She gradually regained power. There was neither swelling nor pain of the affected limbs. The illness was attributed to change of life. At the *date of admission* she now and then had a feeling of pins and needles in the right hand and arm, and sometimes she could not pick up a pin. She considered she had always had good health. She had never been laid up, nor unable to attend to her business, keeping a greengrocer's shop. She lost a good deal of blood *per vaginam* soon after the right eye failed, and had not menstruated since. She had always menstruated very little and irregularly. She had been married twenty-two years before her husband died of phthisis, but had never been pregnant.

There was a large central scotoma before the right eye and she could not read 20 J. with it. She could read No. 6 J. slowly with + 10 with the left eye. She complained of having felt a sharp pain now and then going round the right eye, and lately had felt the same on the left side.

In the right eye, the choroid near the yellow spot was spotted over with yellowish-white, minute, ill-defined patches. Near the disc they were almost everywhere irregularly confluent and were so extensive as to leave very little healthy choroidal tissue remaining. At the circumference of the diseased patch, however, the spots were very distinct, presenting a moth-eaten appearance. Neither at the margins of the spots nor in their centres was there any accumulation of pigment; but near to the yellow spot there were some long, conspicuous streaks of pigment of a bluish-black colour and very irregular in arrangement. They were remarkable for being thin and in parts almost gauzy in appearance. At most parts, the retinal vessels were very distinctly in front of both the white and the black patches, but in a few places their trunks were obscured both by white and by dark deposit. The disc itself was quite clear, its vessels of usual size, and their trunks, with the exceptions just alluded to, were easily traced. *In the left* (without atropine) the conditions were much the same as in the right, but not so advanced. At the yellow spot, there was a white patch with blotches of pigment of the same colour as in the right.

This patient was seen again in *August*, 1875, when the state of her sight and the ophthalmoscopic appearances were about the same.

Her hands, arms, and ankles are still weak, and have, according to her statement, never become so strong as before the first onset of the symptoms. Her fingers become stiff, and in the morning on waking up she always finds them partly bent into the palms, and her hands and arms are then so weak that she has much difficulty in dressing herself. The act of clasping anything with her hands causes pain in the flexor tendons and muscles of the forearms, so that she either cannot or dare not clasp firmly; the grip of her hand is very feeble; these symptoms are symmetrical. The weakness, &c., of the arms and hands is always worse in cold weather, and she then often has pins and needles in them.

She persists in calling the whole complaint "rheumatism." There has, however, never been either swelling or stiffness of the joints nor any pain in them. There is no grating in her shoulders, and she says the knee joints never either crack or become stiff. Weakness and pain in muscles during their contraction, aggravated by cold, are the leading symptoms.

CASE III.—*Similar changes in the Eyes, but in an earlier stage, in a third Sister. History of partial Paralysis.*

Mrs. M., æt. 40, applied at Moorfields in *June*, 1875, complaining that her sight had been failing for about a year. On examining the eyes, Mr. Tay noted "extensive choroidal disease of the central parts; at the circumference of the patches there are isolated spots. The changes are like those in the two sisters formerly seen, and in some others." At this time it had not transpired that the patient was a third sister of the two cases referred to in Mr. Tay's note; on enquiry as to her history, &c., however, she told us that her two sisters, Mrs. G. and Mrs. J., had previously been under my care.

Mrs. M. is a sallow, spare woman, with black hair (just turning gray, regular, well-formed features and a good figure; she is nervous and emotional, and looks care-worn, but appears in fairly good health. She states that her sight began to fail

about a year ago, without any cause apparent to her; the change appears to have been gradual and symmetrical. Her sight is better in the evening than by daylight.

With regard to previous illnesses, she stated that five years ago, and five months after her last confinement, she had an attack of pain and weakness in her left lower limb; there was no swelling of any part of the limb or of any joints, but the pain was very severe and "as if it was being cut to pieces;" the illness lasted three months, and was considered by her medical attendant to be "rheumatic fever," but no other parts than this limb were affected. The limb has remained weak and more or less painful ever since. She had never had anything like it before, nor have similar symptoms occurred again. The confinement referred to had occurred after an interval of nine years from the preceding pregnancy. There is no indirect evidence of syphilis to be obtained. Her husband died six months ago of an accident.

She states that at the age of 18, seven years before marriage, she had an abscess followed by a "fistula" at the anus; there is no history of syphilitic symptoms at that time, and from the frankness with which she mentioned the "fistula," I think that she had no suspicion of my object in questioning her. She has never been considered "consumptive."

Mrs. M. has had four children, the first and fourth are living and reported to have good sight and good health; one of the others was still-born and the other died of convulsions while teething.

The changes in her eyes very closely resemble those in the two elder sisters, but are evidently in an earlier stage. An immense number of small circular spots of choroidal disease enclose the disc and the yellow spot in an ill-defined oval belt. They are of a dull white colour, very closely packed, and in some parts (especially near the disc) are partially confluent. The belt of spots represents only the part where they are most thickly set; all around and within it there are less numerous, but still very abundant, spots, spreading for a short distance on every side and covering the Y. S. region. There is as yet scarcely any pigmentation. Most of the spots are beautifully distinct. When examined with the erect image, it is possible to see a very minute dot of pigment on the centres of some of

them, while an extremely narrow ring of pigment, darker than the neighbouring choroid, often surrounds them. In these respects they closely resemble some forms of minute growths projecting on the inner surface of the choroid as seen in the dissected eyeball, especially the tubercles of acute tuberculosis, and the so-called "colloid" excrescences. It is probable, therefore, that the spots in this patient's eyes are minute elevations of the choroid, though the ophthalmoscopic appearances do not enable us to form any more precise idea of their nature and exact situation in the choroidal tissue. The disc and retinal vessels are healthy in each eye.

The following facts were ascertained from her as to the family history of the three sisters. Her father had what was called very "short" sight, and a brother of his was similarly affected; the defect would appear not to have been myopia, unless extreme and complicated, for she says that both the father and the uncle ultimately became so bad "that they could hardly see to do anything;" it may, however, have been merely cataract; they had no treatment. This uncle was considered "curious" in his manner or intellect. A third brother of her father became insane ("tried to be religious"), and committed suicide; he had been under medical care for mental disorder for two or three months before death. She believes that her parents were not blood-relations; she can give no information as to her grandparents, except than one of them was gouty.

The three amblyopic sisters do not resemble one another specially; the two elder take after their mother, the youngest one is like her father. Their parents had ten children, of whom nine are living and several have families; none of the next generation (nephews and nieces of the patients) are known to have bad sight or any intellectual or nervous defects.

The children are as under:—

1. (f.) Died, æt. 40, of "cancer of the womb."
2. (f.) 60, Mrs. G., the eldest of the three amblyopic sisters.
3. (m.) Living, æt. about 55.
4. (f.) Living.
5. (f.) Æt. 50, Mrs. J., the second amblyopic sister.
6. (f.) Living.
7. (m.) Living.

8. (f.) Æt. 40, Mrs. M., the youngest of the amblyopic sisters.

9. (f.) Living.

10. (f.) Living.

None except the three have any defect of sight.

CASE IV.—*Choroidal disease in Minute White Dots in the neighbourhood of the Disc in each Eye—Commencing Haze of Lenses.*

(Notes by Mr. Waren Tay.)

Mrs. L., æt. 60, single, a cook, came under care at Moorfields, March 28th, 1874. She has enjoyed good health.

She could still see to read. Her sight began to fail about twelve months before she came under care. In both eyes, on ophthalmoscopic examination, a number of very small white spots were to be seen, apparently behind the retinal vessels. In the right eye they were chiefly present on the real inner side of the disc; in the left on both sides. Probably there were slight ones all round. In the inverted image it was very difficult to see them. The lens in each eye was slightly hazy and with here and there a line in it. She had worn glasses for twenty years. There was no trace of hæmorrhage anywhere, nor any change at the yellow spot in either eye. The spots were in groups in a circle around the disc, passing between it and the yellow spot. In the right eye the margins of the disc seem to shade off, but the vessels can be seen clearly. There is venous pulsation.

CASE V.—*Symmetrical disease of Choroid in central parts of Fundus in a Man æt. 60—Minute White Spots—Commencing Opacity of Lens—No obvious cause.*

(Notes by Mr. Waren Tay.)

John L., æt. 60, came under care March 23, 1874, at Moorfields. He seemed an intelligent man and told us that he had noticed a dimness of both eyes just alike for six weeks. He had had excellent sight previously. He had had pains in the tips of the shoulders and down the muscles of the arms. He could see $\frac{2}{0}$ with both eyes open. He was ordered grey powder and quinine three times a-day. A week later he had much pain in his arms.

It is noted that his mother and all her family were subject to cataract; one of her sisters was operated on successfully. One

of the patient's brothers, now æt. 65, had cataract in one eye, and was operated on 17 or 18 years ago successfully at Moorfields. He fancies something is now "dropping down" from the other eye. The patient has had two daughters, the younger of whom had "bad eyes." He has four sons who have no defect of sight. He used to drink much and smoke when young; he was rather wild, but never caught any venereal disease. He had never had any swelling of feet or ankles, but has been liable to "lumbago." He had jaundice 11 years ago, for three weeks, with numbness of the two middle fingers of the right hand coming on regularly for an hour in the morning. When the jaundice came out the numbness went off. The pains in the shoulders did not come on till his sight failed; he mentioned them as very troublesome. In the fundus of each eye there were a number of small spots, some of a glistening white, but the majority of a faint white colour. They all seemed on a level posterior to the retinal vessels; they were of irregular size and shape, and were chiefly situated above and below the disc. In the *right eye* they were fewer in number and distinct from another; there were none visible at the periphery, nor at the yellow spot. In the *left eye* they were much more numerous and were fused together, showing a tendency to form patches above and below the disc; there were a few at the yellow spot, and some faint ones in the periphery. There was a slight central opacity at the posterior pole of the lens.

In *May* 1875 the ophthalmoscopic appearances had not materially changed, and his sight was the same as before, the right being rather the better of the two. The sight is very defective, and he cannot see anything smaller than 20 J. with any glass.

CASE VI.—*Central Choroido-Retinal Disease in small white spots in a Woman of 62—Failure of sight, six months—Incipient Cataracts—Deafness—Choroidal Disease of an earlier date at Periphery—No Albuminuria.*

Mary Anne J., æt. 62, applied at Moorfields in *January* 1873. She was in good health. Her sight had been failing for six months. She had been somewhat deaf for three years, but for six or seven months this had increased, and, on admission, she was very deaf indeed. The urine (tested a few days later) was pale, clear and free from albumen.

On ophthalmoscopic examination a number of very small white spots were found to be scattered widely over the central part of the fundus, being especially numerous in the yellow-spot region. Near the yellow spot in the right eye they had become partly confluent and formed a large white patch. The spots varied much in clearness of shade, some being of a glistening white, others of various somewhat duller white tints; they also differed in size to some extent and were not all circular; the duller coloured ones were especially noted to have somewhat ill-defined borders. Many of them were distinctly behind the retinal vessels and none were proved to be in front. Those near to the yellow spot were, as a rule, of a brighter white than those elsewhere. There was not the slightest pigmentation of any of the white dots. In each eye the optic disc was perhaps slightly pale and hazy, but these appearances may have been due to the incipient general haze of the lenses which was observed on oblique illumination. At the extreme lower part of the periphery in each eye were several round patches of old choroidal disease; atrophic choroid with some pigment accumulation.

CASE VII.—*Central Choroido-Retinal disease in a Man of 74; small white spots—Failure of sight several years—Deafness—Incipient Cataracts—No Albuminuria—No evidence of Syphilis.*

Benjamin P., æt. 74, was admitted in *January*, 1873. The sight had been failing in his right eye for four or five years; and in the left two or three years. He was very deaf and had been so more or less for many years. His wife said that in other respects he was in good health. About 30 years previously, and before marriage, he had had some eruption on the face and head which had caused the loss of much of the scalp hair and produced a number of small acne-like scars on some parts of the scalp. There was nothing to show that this eruption was syphilitic, nor was there anything confirmatory of that suspicion in the history which his wife gave of their childrens' health.

The pupils were inactive. *Ophthalmosc. exam.* showed commencing cataracts and a number of well-defined white spots in the fundus of each eye at the yellow-spot region. These spots were

more numerous in the right than in the left eye, but had the same general characters in each. By careful inspection it was not difficult to see that they were of two varieties—(1), very small circular bright white dots probably situated in the deep layers of the retina; (2), spots for the most part rather larger and less regular in outline than the former, and of a duller tint; sometimes abruptly defined, in other cases showing somewhat diffused borders, for the most part unpigmented but sometimes inclosed by a thin collar of black pigment. These were undoubtedly seated in or on the choroid. It was difficult to feel certain whether they were deposits, or spots of partial atrophy; it was certain that they were not of the same character as those abruptly defined circular patches of atrophy, seen in old cases of disseminated choroiditis, which look as if bits of choroid had been punched out. The urine was found to be quite free from albumen.

CASE VIII.—*Central Choroidal (or ? Retinal) disease in small white dots in a Man of 64—Slight Albuminuria.*

John B., æt. 64, a labourer, applied on March 18, 1875. His complexion was pale and sallow, and his face somewhat puffy; he said that his legs swelled, and were more swelled in the morning than later in the day. He had never had rheumatic fever and never been dropsical.

On ophthalmoscopic examination some small white spots were found in the fundus on the nasal side of the disc (none on the yellow-spot side). They were arranged in a curved line. They were very white. One of them was crossed by a retinal vessel, but there was some difference of opinion as to whether they were seated in the choroid, or in the deep layers of the retina.

His urine contained a small quantity of albumen, just enough to give a definite reaction.

CASE IX.—*Central Retinal Disease in minute white dots in a very senile Man of 48, in bad health—Failure of sight, two months—Deafness—Slight Albuminuria—Old rupture of Choroid in other Eye.*

William C., 48, a carpenter, applied on account of failure of his right eye in July, 1875. It had been failing for about two

months, and he could only see letters of 18 J. with it; pupil active and of ordinary size. The other eye (left) had been defective ever since he received a kick on the corresponding eyebrow by a horse in childhood; with it he could barely see letters of 20 J.; pupil rather dilated and scarcely dilates more when covered. He is a stoutish man, but is feeble and bent, looking at least 10 years older than he is; memory bad, manner confused. About four or five years ago he went out for some months to the West Coast of Africa to build a house; he had "fever and ague" there and brought the disease home with him. Although he got rid of the fever six months after his return home (three—four years ago), he has never been strong since, and he says he has aged very much since going to Africa. For the last year and a half he has been somewhat deaf, and this gets worse. He has had no headache, only "a little dulness about the forehead" since his sight failed. The pupils did not dilate widely under atropine. In the right eye we found numerous minute very white dots in the fundus between the disc and the yellow spot, and involving the yellow-spot region to some extent; they were apparently in the retina. There was also some greyish opacity of the retina along the large vessels. No changes elsewhere. In the other eye (defective since the kick) there was a very large area at the yellow-spot region where the choroid was atrophied and the exposed sclerotic partly obscured by abundant pigment; changes probably resulting from an extensive rupture of choroid with hæmorrhage from its vessels, caused by the injury.

A few days later his urine was tested and found to contain a small quantity of albumen. At the end of *August* he was no better. Iodide of potassium had been given.

CASE X.—*Central Choroidal Disease in small white spots—Slight failure of Sight one or two weeks—No Albuminuria—Patient perhaps remotely Syphilitic.*

Ellen H., 38, a widow for the last 12 months, found her sight failing slightly for a week or two before admission on *June* 28, 1875. Her sight was found, on trial, to be nearly perfect, and her complaint of slight dimness was at first referred to hypermetropia. The defect was, however, not remedied by any glasses; and, on ophthalmoscopic examination, it was found that in each

eye a large area in the central part of the fundus was occupied by numerous, small, round, yellowish-white spots. They occupied each yellow-spot region, and extended also in the form of an ill-defined broad belt inwards around the optic disc; their arrangement thus much resembled that in Case III already described. The spots were not sharply defined at their edges, nor were they of a glistening bright white, but rather yellowish-white; from these characters there seemed no doubt that they were choroidal and not retinal. There was no albumen in the urine (tested a few days later). At the end of *August* she considered her sight to be better, and could read 1 J. She had taken the iodide.

The woman showed no outward evidences of syphilis; and, although she said that her husband had been unsteady and that she believed he had had venereal disease after marriage, she was not aware that she had ever had any local or general symptoms of the disease. The history of her children rather tends to confirm her belief that her husband had the disease after marriage (? between the 1st and 2nd pregnancies).

Her 1st child died at *æ*t. 18 months, later than the usually fatal period in infantile syphilis.

The 2nd died at two months of "teething."

The 3rd still-born.

The 4th died at 10 months of "teething."

There was, however, no history of syphilitic symptoms in any of them, nor did it appear that she herself had ever suffered.

The last of the series differs in some important features from the others, more especially as regards the age of the patient and the probability of syphilis. It resembles them, however, in respect to the ophthalmoscopic appearances, and thus I have thought it well to print it in juxtaposition.

It is only right that I should state, in concluding my report, that I was indebted to my friend and colleague, Mr. Waren Tay, for much more than the mere notes of the first cases. The patients were under my care, but it was he who made the ophthalmoscopic examination, and drew my attention to the peculiarities presented. I have failed to find in our standard works and atlases any description of similar cases. The disease is not improbably a well characterised and important form of senile amaurosis.



FIRM FIBRO-CELLULAR TUMOUR OF UPPER LID, INVOLV-
ING THE SUB-CONJUNCTIVAL TISSUES ABOVE THE
TARSUS, AND NOT IMPLICATING THE SKIN.
REMOVAL ABOUT 14 MONTHS AFTER FIRST APPEARANCE
OF ENLARGEMENT OF EYELID.

By JONATHAN HUTCHINSON.

Charles Reese, æt. 38, a light-haired, blue-eyed German, began to notice an enlargement of his right upper eyelid, about 9 months before he came under my care at Moorfields. He stated that the enlargement was first observable near to the eyelashes.

For the first 6 months he had no advice; the swelling having continued to increase, he went to a medical man 3 months before admission, and saw him at intervals all the time. He was directed to pinch the swelling firmly several times a-day, a proceeding which was repeated by the medical attendant at his visits.

He was admitted at Moorfields on *November 11th*, 1872, with "hypertrophy (?) of upper tarsal cartilage of right; no fluctuation" was noted. Lead ointment was ordered. A fortnight later, iodide of potassium, in five-grain doses with ammonia, was ordered; and, on *December 19th*, the dose of iodide was increased to ten grains. On *January 30th*, 1873, the swelling was noted to be "rather less," but on *February 20th*, "it is again swollen." Iodide of lead ointment was directed to be rubbed into the swelling and the medicine continued.

On *April 17th*, no improvement having taken place, determined to operate. There was at this time a "firm, uniform swelling of the eyelid," along its whole length, with some cedema of the skin.

On passing the finger up between the eyeball and the

lid a firm substance was felt, attached above to the lid, but projecting downwards for some distance as a tongue or lobe which thus lay free between eyelid and globe.

The tumour was removed at this date, 14 months after its commencement, by an incision corresponding to its upper edge. Its lower part passed insensibly into the tissue of the tarsal cartilage, with whose inner surface, near the upper edge, the tumour seemed to be continuous. Part of its inner surface was covered by closely adherent conjunctiva, and from this part a duplication or tongue of the tumour passed downwards between lid and eyeball. The adherent conjunctiva was removed with the tumour, leaving a considerable gap in the palpebral part of the membrane. The gap did not, however, take the whole length of the tumour. The part removed was about a quarter-of-an inch thick, and an inch wide from above downwards. It extended from the conjunctiva deeply into the cellular tissue of the eyelid, reaching close to the muscular bundles of the orbicularis. It was very firm, but on section did not prove to be gritty or ossified or cartilaginous in any part. Divided vertically while quite fresh, it showed a mottled surface of yellow, pinkish, and grey-white, the pinkish prevailing; near its upper (thickest) border was a considerable yellowish patch. The greatest part of the surface was finely granular, but intersected by shining, apparently fibrous, lines. These were most obvious and abundant at and near its line of fusion with the upper edge of the tarsal cartilage. Scraping gave a little dryish material but no proper juice. The texture was moderately firm and tolerably uniform. The tints were like a myeloid tumour, but the granular surface more resembled gland tissue. The tumour was thickest at its rounded upper border, and became gradually thinner towards its (virtual) edge where it joined the tarsal cartilage. Its anterior surface was convex, its posterior surface, on the whole, concave.

Dr. Buller examined teasings of the fresh tumour; he found fibrous tissue and numerous small round nuclei or corpuscles.

A coloured drawing was made of the cut surface of one half while fresh; the remainder was hardened in Müller's fluid for further examination, when sections were made antero-posteriorly through the thickness of the tumour, and examined by Mr. Nettleship. Some were stained in carmine; part of the sections were mounted in glycerine, others in dammar.

The growth was found to consist essentially of imperfectly developed fibro-cellular tissue, not unlike granulation tissue in some parts. The supply of blood-vessels was relatively scanty. The cellular elements were small, round, and each almost filled by a large nucleus and small nucleolus. In the deeper parts the proper fibrous tissue of the eyelid was infiltrated by the new cells, to a varying extent in different parts, and in a few spots even the cells of adipose tissue found in this region were separated by small collections of similar round cells. The conjunctival surface of the growth was covered by a very thin layer of flattened epithelial cells.

The only indications (and these doubtful ones) of glandular structure were seen in two or three cross sections of small tubes, lined by large columnar cells; these were quite near to the mucous surface of the mass, and looked like sections of small gland-ducts.

The characters of the tumour varied somewhat in different parts; no great degree of development, however, had taken place anywhere; and, on the other hand, nowhere was there the least sign of fatty or other degeneration. Immediately beneath the conjunctival surface there was a thick stratum, consisting entirely of the round cells described, without any trace of intercellular substance; there were also several similar collections, purely cellular, more deeply seated, one or two of them of large extent, others small and in the immediate neighbourhood of blood-vessels. In the deeper (more central) parts, however, the cells were everywhere separated from one another by a reticulated network of finely dotted and faintly fibrous tissue. Thicker bands were formed by the union of the fine meshes which separated individual cells

or small groups; while in parts where the fibrous element was most developed, it consisted of rather wide tracts or bands, enclosing comparatively few cells, these being either in small groups or scattered singly. There was very little, if any, evidence of development of round cells into spindle cells, and of these, again, into the intercellular fibrous tissue. On the other hand, even in parts where the fibrous change had gone furthest the remaining cells preserved their nearly round forms, or were at most only angular from pressure. The intercellular tissue was indistinctly fibrous, being more nearly hyaline, but with a slightly striated wavy appearance, and also more or less finely dotted. The larger bands ran sometimes at right angles, at other times more or less parallel to the conjunctival surface, and thus often inclosed rudely rectangular spaces. The general structure was more suggestive of the subconjunctival fibrous tissue having become closely packed with indifferent cells, than of a growth in which the fibrous elements had been developed from the newly-formed cells.

I saw the man again in June, 1875, three years after the removal of the tumour. There had been no return at the seat of the operation, but there was a small growth at the outer canthus between the lids and the eyeball. It was very firm, of pinkish colour and flattened, with a free, somewhat lobulated border, and looked not unlike a much enlarged carbuncle; it was attached to the inner surface of the lid. The operation had been followed by considerable puckering of the inner surface of the upper lid. The ptosis had not been relieved. The skin of the lid was extremely lax and abundant, and there was still some slight thickening about the free border of the lid. A gap could be felt easily in the position formerly occupied by the tumour.

Fibroma of the upper eyelid is mentioned in the ophthalmic treatises (Wells and Wecker), the disease apparently being described on the strength mainly of two cases. In the first of these, recorded by Græfe, a young woman of twenty came under care for a circumscribed ovoid tumour of cartilaginous

consistence imbedded in the submucous tissue of the upper lid; it was covered by smooth conjunctiva. It bulged the skin, and, on eversion of the lid, it projected from the sulcus of the conjunctiva, being about as large as a hazel nut. Some swelling was known to have existed for many years, but only during the last few years had any disagreeable symptoms (a feeling of pressure) been present. The tumour was excised and Schweigger found that it contained a central portion of true bone a quarter of an inch (6 mm.) long, surrounded by thickened cellular tissue, and covered on its free surface by healthy conjunctiva.

The second case is related by Wecker.* The patient was again a young woman of twenty. Below the left upper eyebrow she presented a tumour four-fifths of an inch long by about two-fifths wide; there was very little elevation of the skin, but when the lid was everted the tumour projected from the conjunctival sulcus like a second tarsal cartilage. It was covered by healthy conjunctiva. It felt as hard as a plate of bone. The patient had noticed it for three years, but considered that it had increased very little during that time. She declined operative treatment.

In the Ophthalmic Hospital Reports, vol. i, page 35 (Mr. Bader's Report of Operations), it is stated that "a peculiar warty-looking growth, causing ptosis, was removed by Mr. Bowman from the upper cul-de-sac of the conjunctiva," in 1857. Unfortunately no further details are given, and we are scarcely warranted, from the above account, in confidently classing this with the two preceding cases.

Talko† recently met with a case where, in a boy aged 12, a pedunculated tumour grew from the palpebral conjunctiva of the upper lid. Although the case did not resemble the one here recorded, a short abstract of it may be of interest in connection with rare tumours of the upper lid.

The patient, a peasant boy of twelve, was admitted in

* *Traité des Mal. des Yeux*, vol. i, p. 650, 1867.

† Zehender's *Klin. Monatsbl. f. Augenheilkunde*, 1873 (November), p. 326. A woodcut representing the tumour *in situ*, is given.

June with an oval tumour as large as a hazel-nut lying between the eyeball and the upper lid and attached to the palpebral conjunctiva; its base extended from the tarsal cartilage to the oculo-palpebral fold where the pedicle spread out on either side. It was, when first seen, covered with clotted blood, but, on examination, was found to be soft, elastic, of dark red colour, its surface being smooth as if covered by mucous membrane; it bled when touched. The boy's mother stated that in the preceding autumn he had received a blow on the eye which was followed by considerable bleeding, and that soon afterwards a tumour began to grow. This the mother tore off with her fingers as soon as it appeared externally; finding that it grew again she cut it off with scissors; and, lastly, this not being successful, she tied a pig's bristle round its stem two weeks before she brought him to the author, the ligature being still present on admission. Having everted the lid, Dr. Talko cut off the tumour, together with the surrounding somewhat thickened conjunctiva. The wound, which occupied a large part of the conjunctival surface, healed well. Six weeks later a little nodule as big as a hemp-seed which had formed in the scar was removed, and since then the patient had not been heard of. In shape and mode of attachment the tumour resembled a polypus; it was tolerably soft and easily torn by pressure; its cut surface grey and quite smooth; after hardening in spirit a number of holes like needle-pricks were visible. Microscopical examination showed a stroma of connective tissue inclosing small spindle-shaped cells. The growth contained blood-vessels. The spindle-cells formed its chief constituent, and the author regards it as a small-celled, fusiform-celled sarcoma; not, as its coarser features suggested, a polypus. It is stated that he was a strong boy of healthy parentage.

A CASE OF EMBOLISM OF THE CENTRAL ARTERY OF THE
RETINA.—SUBSEQUENT GLAUCOMA, TEMPORARILY RE-
LIEVED BY IRIDECTOMY.—RECURRENCE OF GLAUCOMA.
—ENUCLEATION.—MICROSCOPIC EXAMINATION OF THE
OPTIC DISC AND NERVE.

By MESSRS. W. SPENCER WATSON, F.R.C.S., and
EDW. NETTLESHIP, F.R.C.S.

Esther W., æt. 62 years, unmarried, applied at the South London Ophthalmic Hospital, and was under Mr. Watson's care in April, 1874.

History.—Six years ago she had a severe attack of epistaxis, which necessitated plugging of the anterior nares; three years ago she had bronchitis, but has never suffered from any other serious illness till April 5th, when sudden acute pain came on in the right eye, the sight of which was immediately lost.

During a few days before this, she had suffered from slight pain in the side of the head, and this became suddenly extremely severe when the sight was lost.

Condition on Admission on April 7th.—She is a short, stout, somewhat pallid woman. She states that she suffers occasionally from palpitations and shortness of breath on making any sudden or unusual exertions. There is a bruit heard over the precordial region and the heart sounds are feeble.

The right eye is absolutely sightless, there being no evidence of even the faintest perception of light. The pupil is fixed and dilated, but partially contracts in concert when light is acting on the sound eye. With the *ophthalmoscope*, the following appearances were noted in the affected eye:—Margin of optic disc blurred by a hazy pink discoloration; veins large and tortuous; arteries small and thready.

April 15.—Vision remains as before. The movements of the eyeball are much limited in every direction, but least so downwards. There is no noticeable protrusion of the eyeball. Slight tenderness is observed on the upper, inner and outer margins of the orbit. The ophthalmoscopic appearances are scarcely at all changed, but the arteries are a little more distinct, and the veins are still large and interrupted here and there by deposits.

At first the condition somewhat resembled that of retinitis, and a short course of mercury was given with the effect of making the gums slightly tender. Ice-balls were at the same time applied to the eye. She was relieved so far as pain was concerned, but sight was not restored. On the evening of *April 17th*, she became suddenly insensible, and was laid up in bed for a fortnight under the care of Dr. Green, of Peckham. On *June 10th*, I again saw her; she had then congested sclerotic, discoloured and turbid anterior chamber, increased tension of the globe, pain in the eye and across the head, and, in fact, all the symptoms of glaucoma. An appearance as of a deposit in the upper and outer part of the vitreous was seen with the ophthalmoscope.

June 16th.—Severe pain and tension continuing, I performed iridectomy upwards. For some months after this there was no return of pain nor of tension, but on *October 2nd* these symptoms having both returned, paracentesis of the cicatrix was performed by Mr. McHardy, in my absence.

This operation gave only temporary relief notwithstanding the administration of opium in large doses, and frequently; and on *October 6th*, the pain continued so severe that I advised enucleation. To this the patient consented, and ether having been administered by Mr. McHardy, the operation was performed in the usual way.

The relief experienced by the poor woman was complete, and she was truly thankful to be rid of her very painful and troublesome eye.

On the *23rd October* an artificial eye was fitted, and she

has worn it ever since with comfort. There is some impairment of sight of the remaining eye, and at one time the patient complained of seeing a black stringy spectrum before her. This, however, has passed off, and her sight remains good enough to enable her to read large print and do coarse needlework.

With a biconvex glass of 11-inch focal length she could, on *March 18th*, 1875, read J. 4 easily; the tension was normal and no pain nor chromopsiæ were complained of: general health good; heart sounds normal.

W. S. W.

Examination of the Specimen, and Remarks.

The eye was kept for several weeks in Müller's fluid and then hardened in alcohol. Its size and shape were normal. The only change visible to the unaided eye was slight and irregular detachment of the retina, a result which, I think, is sometimes due to the effect of Müller's fluid.

Sections of the optic disc and the ocular end of the optic nerve were made parallel with the optic nerve fibres, and as nearly as possible in the direction of the main divisions of the central vessels.

Two of the slices contain longitudinal sections of the central artery long enough to be of use, the most extensive being rather more than $\frac{1}{25}$ inch (1 mm.) in length. In a third section the continuation of one main division of the trunk upwards can be followed as far as the commencement of the retina. No section, however, shows the actual point of division of the main trunk into branches, though this would probably be at *e*, where the branch *d* begins.

The whole of the portion of the *arteria centralis* included in the specimen shows very striking changes. Its calibre is throughout much diminished, and the *tunica intima* is strongly and irregularly wrinkled, the latter change being by far the most marked at a point a little above the lamina cribrosa, where it is extreme (*a*). Immediately above this

point the vessel contained in the section rapidly becomes smaller, while the wrinkling of its intima as suddenly ceases altogether; no doubt this diminished vessel (*d*) is, as already mentioned, really one of the main terminal divisions of the *arteria centralis*, the remaining branches not being included in the section. The *tunica adventitia*, both of the *arteria centralis* and of the above-mentioned branch, is everywhere thickened in proportion to the diminished calibre of the vessel, and infiltrated with finely granular substance, but the sheath of the vessel is not increased in *absolute* size. The *muscular coat* follows the puckerings of the *intima*, and can be recognized everywhere, except at the uppermost part of the trunk, where the wrinkling, as mentioned already, becomes extreme (*a*). This tunic in the branch *d* is œdematous. The branch *d*, as well as a secondary branch given off further and not shown in the figure, is everywhere very much smaller than in health; it appears slightly narrowed just at its origin, *e*, afterwards dilating a little.

The whole of the portion of *arteria centralis* included in the specimen is occupied by fibrous-looking material mixed with a molecular substance, containing scattered corpuscles. The corpuscles almost all look like white blood-cells, but here and there is a red corpuscle. The fibrous substance is irregularly distributed, and does not everywhere fill the vessel, having long spaces in its own substance, or bridging over one or several of the foldings of the *intima*. Both the fibrous and the granular substance are slightly stained by carmine. At the point of greatest distortion (*a*), where the arterial tunics are extremely puckered, the lumen of the vessel is, I think, quite filled by these pink substances.

The branch *d* is either quite empty, with the exception of an occasional corpuscle, or it is uniformly filled by a perfectly homogeneous and colourless substance. As its lumen is seen for the most part through superjacent tissue, it is difficult to decide upon this point, but the pink contents of the trunk appear to cease at *e*.

No attempt is made to show the character of the arterial

contents in the wood-cut; the outline of the vessel is however accurately represented.

There can be no doubt, I think, from the changes shown



Longitudinal section of the *Arteria Centralis Retinæ* 6 months after the occurrence of Embolism.

by this artery and its contents, that it had ceased to carry blood for a considerable time before the eye was removed;

and although, partly from imperfections in the sections, partly from the small and puckered lumen of the vessel, it is not possible to give so definite a description of the fibrous and granular contents as is desirable, I think enough can be seen by careful examination to warrant the conclusion that they are probably of fibrinous nature.

It is quite possible that some of the spaces and channels in the contents of the artery may be new vessels developed in organized fibrin, but I cannot be sure of this. The extreme puckering seen at the upper end of the artery, which is at or close to its division into branches (*a*), suggests this point as the seat of the earliest changes, while, on *a priori* grounds, it is a point at which an embolus of sufficient size would be likely to be arrested.

The changes seen in the other structures of the nerve and neighbouring parts are indicative of chronic inflammatory œdema. There is an old extravasation in the disc, œdema and atrophy of the retina, inflammation and thickening of the hyaloid membrane, œdema of the choroid, and finally inflammatory changes in the subvaginal space leading to almost complete obliteration of its cavity. The rods and cones are quite atrophied on one side of the disc, but on the other side seem healthy, or only slightly elongated.

The *vena centralis* is shown in one section, and is filled with finely granular cells, resembling white blood-cells and stained by carmine, mixed with a few rust-coloured granules; an appearance probably due to thrombosis. The vein is not shown in the sections which contain the artery.

I think I should hesitate in ascribing the changes found in this specimen to embolism of the *arteria centralis retinæ* had I not previously examined another specimen in which the appearances were much better marked than in the present case, the changes not having advanced so far and the sections fortunately giving a better view of the artery and its branches. Read by the light of that specimen, however, I have no doubt that the present case is one of embolism. It seems probable

that the occlusion of the artery was complete from the first, and that the subsequent congestive and inflammatory changes were as a consequence more considerable than in the former case, where these changes were slighter and the symptoms pointed to the occlusion having been only partial in the first instance.

Professor Schmidt has lately published a case (Graefe's Archiv.), in which the presence of an embolus in the central artery of the retina was proved by post-mortem examination. The vessel was plugged completely soon after piercing the nerve sheath, and a branch given off near its entrance into the nerve and running parallel with it was also occluded. There was also a distinctly circumscribed embolus in a small retinal artery. The more distal part of the *arteria centralis* and its branches in the disc were filled with partly decolorised clot ("yellowish hyaline thrombus"), and the *vena centralis* was also partly filled with clot. At one part of the *arteria centralis* a small vessel containing blood-corpuscles had become developed in the thrombus. The nerve-fibres of the optic nerve between the eyeball and the part at which the plugging began were much atrophied; there were some psammomata in the meshes of the connective tissue forming the nerve-sheath near the sclerotic, and lastly, considerable changes in the central parts of the retina and choroid.

The specimen was obtained from a man, æt. 58, who died 10 months after sudden, complete, and permanent blindness of his left eye.

The case was complicated by symptoms of irido-choroiditis, opacities in the vitreous, chemosis and protrusion of the eyeball, due probably to emboli in the ciliary arteries. Several of the smaller branches of the ophthalmic artery arising near the *arteria centralis retinæ* were found completely plugged in the specimen.

Ophthalmoscopically the retina and disc showed changes like those met with in other cases of embolism.

With respect to the cause of the permanent loss of sight in cases of embolism of the *arteria centralis retinæ* the recent

examinations of specimens show that this may be due both to changes in the retina and in the optic nerve.

As regards the *retina*. (1) In Wordsworth's case (recorded by Nettleship) the rods and cones were much swollen and lengthened, the nerve-fibres of the disc were swollen, and inflammatory cells probably lay between the individual fibres; minute growths projected from the disc into the vitreous, the outer surface of the latter (hyaloid) was altered, and the retinal tissues generally showed signs of prolonged oedema; four months having elapsed since symptoms began. (2) In the case recorded in the present paper it has been already mentioned that there was oedema and atrophy of the retina, with complete atrophy of many of the rods and cones and thickening of the hyaloid, six months after symptoms began. (3) In Schmidt's case (ten months after symptoms began) there were considerable changes in the central parts of the retina and choroid. The *optic nerve and its sheath* in Wordsworth's case (four months' interval), I have found, on further examination of the sections since the former description was written (vol. viii, pt. 1, of these Reports), that the *subvaginal space*, close to the eyeball, contains a great number of rather large, oval, or nearly round corpuscles, imbedded in a fibrinous-looking material, which is interposed between, and wraps round, the normal connective tissue trabeculæ of this part, and is often prolonged into processes stretching from one part of the space to another. The corpuscles have thin, sharply defined outlines, and a single bright nucleolus. In Watson's case (the subject of the present paper), (six months having elapsed since symptoms set in), the subvaginal space was quite obliterated on one side of the nerve and very much diminished on the other side by a fibro-cellular tissue, consisting of long spindle, or fibre-cells and branched cells, enclosing the normal trabeculæ, and containing oval clearly defined nuclei of the same characters as those in the earlier specimen. It was the observation of these very marked alterations which led me to examine more

carefully the sections from Mr. Wordsworth's case. These changes in the subvaginal space are clearly of the same nature in both cases, being more advanced in the case which had lasted six months than in that of only four months' duration. (4) Priestly Smith records that the "optic nerve was found to be somewhat shrunken throughout the whole of its length" in his specimen, which was obtained at an interval of four months after the symptoms began. In Schmidt's case, fourteen months after commencement of symptoms, there were psammomata in the nerve-sheath, near the sclerotic. (5) The specimen examined by Sichel (fourteen months after symptoms set in) was removed so long after death that no inference could be drawn from the minute structure of the retina; the disc was, however, completely atrophied, and the retinal arteries reduced to grayish white threads, even to the peripheral branches.

When the above was printed, I had not seen Dr. Loring's "Remarks on Embolism" (Amer. Jour. Med. Sci., April, 1874), in which he records Dr. Delafield's report on an eyeball excised for glaucomatous symptoms eleven weeks after the supposed occurrence of embolism. In this case the central artery and vein were "nearly empty," there were signs of connective-tissue hypertrophy in the *lam. crib.*, atrophy of nerve-fibres of retina and changes in the rods and cones, increase of lymphoid corpuscles in the choroid, and thrombi in some of the large choroidal veins. Beyond the fact that the *art. centr.* was nearly empty no details of its condition are given.

E. N.

NOTE ON THE RETINAL BLOOD-VESSELS OF THE YELLOW-
SPOT REGION.

By EDWARD NETTLESHIP, F.R.C.S.,
Surgeon to the South London Ophthalmic Hospital.

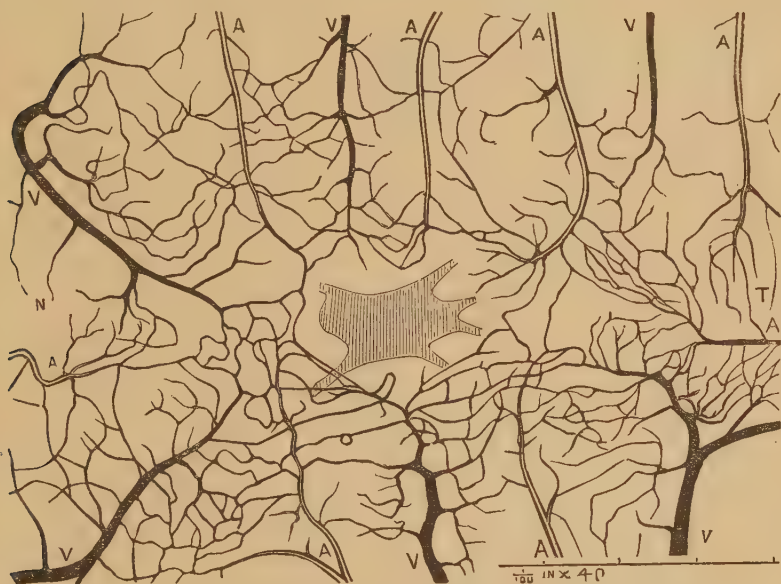
The wood-cut accompanying this note does not illustrate any new facts. Everyone is aware that no blood-vessels cross the *fovea centralis*, while everywhere else the retina is abundantly supplied with them. I have not, however, seen any illustration showing the precise distribution of the capillaries and minute arteries and veins of this part of the retina, and as statements are occasionally made which imply some want of certainty on the point, a copy of a tolerably well injected specimen of the part in question may still be of some interest in relation to morbid changes occurring there.

Some good ophthalmoscopic drawings of the blood-vessels in the region of the yellow spot are given by Delorme, in an article on this part of the retina,* where he states that a greater number of the smallest arterial and venous twigs can be seen with the ophthalmoscope in the region of the *macula lutea* than in any other part of the retina. His figures represent only the larger twigs, the minutest divisions and the capillaries being invisible. Dr. Loring also, speaking of the yellow spot in his "Remarks on Embolism,"† believes that "contrary to the general opinion, which would have this region barren of vessels, it is the place of all others of the whole retina which is most supplied with minute vascular twigs." On the other hand, a recent writer, in ascribing the well-known haziness of the yellow-spot region in cases of embolism of the *arteria centralis*, to necrosis of the retinal

* Journal d'Ophthalmologie, 1872, p. 92, &c.

† American Journal of Medical Sciences, April, 1874, pp. 313—328.

tissue, says that "it is both theoretically probable and practically established that, in a necrosis of this kind, the primary impairment will be in the region of the macula lutea, *a spot which in the normal state is particularly devoid of vessels*"* (my own italics). While fully admitting the occurrence of a permanent degeneration of tissue in the cases alluded to, I cannot accept the above explanation of it, resting as it does on an error of fact.



Blood-vessels of the yellow-spot region of the Human Retina, injected. A, Arteries; V, Veins. N, Nasal side of yellow-spot (towards optic disc); T, Temporal side. The shaded area in the middle is the *Fovea centralis*.
 × 40.

The above figure is taken from a specimen of human retina which I injected in 1871 with an acid carmine fluid containing a very small proportion of gelatine. It is a

* J. Samelsohn, of Cologne, "Embolism of the Central Artery of the Retina," Knapp's Archives of Ophthalmology and Otology, vol. iii, No. 2, pp. 44—74. 1874. The quotation is from p. 62.

tolerably complete injection, and the fluid has run through the capillaries into the veins, so that all the vessels can be easily traced. A few of the capillary loops are broken or distorted, and some others are not filled; but the general plan of their arrangement, the closeness of the network, and the comparatively short length of capillary vessel which, in this part of the retina, intervenes between the finest arterial and venous twigs, are well shown. The capillary network is closer in this region than in any other part of the retina, its meshes gradually becoming larger towards the *ora serrata*. At the *ora serrata* the capillaries end, as is well-known, in wide loops, whilst a great length of capillary often separates the smallest arteries from the venous radicles. On comparing different parts of the retina, I find that while on an area of $\frac{1}{2500}$ square inch in the yellow-spot region at least 40 complete meshes can be counted, not more than from six to nine are included on the same area at a spot $\frac{1}{10}$ inch behind the *ora serrata*, the injection being equally complete in both places. The area of the *fovea centralis*, which is destitute of vessels in the specimen here figured, is equal to about $\frac{1}{4200}$ square inch, and is irregularly oblong; it is scarcely larger than the single capillary meshes at the *ora serrata*.

There are no direct anastomoses between the arterial branches, but on the temporal side of the part (T in the figure) two or three of the smallest arteries are indirectly and rather closely united by capillaries. Such a slight communication as this is almost certain to vary in different eyes, and can scarcely have any general importance; when present, however, it may exert some influence on the changes occurring after embolism of single branches of the retinal artery.

The above figure and facts enable us to assert that the part of the retina which becomes most hazy after embolism of the central artery, viz., the area immediately surrounding the *fovea centralis*, is also the part which is most freely supplied with arteries, capillaries and veins; while the very

spot which, in the typical cases, is quite free from opacity, viz., the *fovea centralis* itself, is also the only part devoid of blood-vessels. We may therefore conclude, on anatomical grounds, that the haze in question is probably due, as suggested by Loring,* to transudation into the inner layers of the retina, which occurs when the circulation is brought more or less to a standstill, and takes place most freely where the vessels are most numerous; and that it is not caused, as Samelsehn implies, by rapid death of the tissues owing to the stoppage of a normally very small supply of blood.

* *Loc. cit.*, p. 316.

THREE CASES OF MALIGNANT TUMOUR PRESENTING SOME POINTS OF UNUSUAL INTEREST.

By EDWARD NETTLESHIP, F.R.C.S.,
Surgeon to the South London Ophthalmic Hospital.

The specimens described in the following cases came into my hands whilst Curator of the Moorfields Hospital Museum, and ought to have been recorded in an earlier number of these Reports. I had not time to examine them until recently, and am now indebted to the kindness of the members of the Staff under whose care the cases came for permission to make use of them.

CASE I.—*A case in which a Sarcomatous Tumour (pigmented and spindle-celled) formed in the Ciliary Body, at the seat of a former injury, in a girl æt. 18—The Eye removed for inflammation and pain four months after operation for Traumatic Cataract, no Tumour being suspected.*

Lavinia Barnes, living at Avon, near Ringwood, Hampshire, Mr. Hulke's patient, wounded her right eye in the summer of 1871, by suddenly knocking a sharp stick against it as she was stooping. Very little pain or inflammation followed, but the sight of the injured eye was impaired and became gradually worse, and she never saw to read with it after the accident. At the end of twelve months Mr. Hulke removed a traumatic cataract by suction; there was at the time great limitation of field and bad perception of light. The eye remained quiet for about four months after the operation; then pain came on, and after enduring this for a fortnight she came up again and Mr. Hulke removed the eyeball. The other eye was at the time becoming irritable, but its sight was good. The lost eye was removed in December, 1872, a year and a half after the injury, the patient being 18 years old.

State just before Excision.—"Right eye, pupil acts somewhat;

it is irregular and of moderate size, and its area white; iris brown and not discoloured. There is a linear slightly depressed scar about a $\frac{1}{4}$ inch (6 mm.) long at the upper and outer part of the sclero-corneal junction, and there appears to be a slight deficiency of the peripheral part of the iris at that spot. Good p. l.; T. slightly +; eye very tender; all the visible vessels intensely congested, the upper ciliary veins especially so."

No suspicion of tumour being entertained, enquiries were not made as to her family history; nor was the eyeball examined further until it had been for four months in Müller's fluid, when it was divided at the equator. The *vitreous* was fluid (excepting a thin peripheral layer) and clear; it became nearly solid from coagulation on addition of nitric acid, but scarcely coagulated at all when boiled without addition of acid. *Retina*, showed a number of little foldings at *ora serrata* and also in the posterior half of eye, and was perhaps somewhat thickened. A rounded dark tumour, the size of a small cherry, but somewhat less globular, occupied the position of the ciliary body at the upper and outer part of the globe. An antero-posterior section through the middle of the tumour passed through the centre of the scar before mentioned, which was now recognisable as a narrow whitish band at the sclero-corneal junction. The tumour had a wide base of attachment extending from the ciliary border of the iris in front nearly up to the *ora serrata* behind, and increasing in width from before backwards. It occupied the position of a large part of the lens and neighbouring vitreous, and extended quite to the axis of the eye, so that had the pupil been clear the growth would have been partly visible without looking obliquely into the eye. Its base in front extended in the form of a little prominent roll just in front of the ciliary margin of the iris, which was here depressed; and it was this dark advancing projection which I mistook before excision for a gap in the iris. There were some black patches and streaks, probably old blood extravasations, in the outer surface of the vitreous, both near the base of the tumour and in the posterior part of the eye. There was a small button of whitish substance in the position of the lens.

The tumour was composed of the fusiform and spindle cells which form the majority of choroidal tumours. They were of rather large size. The colour of the growth, which in thin

sections was brownish, was caused partly by numerous dark brown granules and granular masses, partly by a general brown colouration of the cells, which varied in degree in different parts. The ciliary muscle was entirely replaced by the morbid growth which had pushed forwards between sclerotic and iris and was just beginning to present in the anterior chamber. This part of the tumour presented a convex outline and was marked off very sharply from the iris, the tumour being composed of spindle cells very closely packed and at this point very highly pigmented; while the iris immediately adjoining, although thickly infiltrated with cells, showed no similarity in the colour, or refraction, or arrangement of its elements to those of the tumour. The *ciliary processes* were free, being pushed forwards and somewhat compressed on the front surface of the tumour; the growth had only just begun to intrude into the bases of some of them. Notwithstanding the large size of the growth, the layer of pigment epithelium of the ciliary body was still present over the greater part of the tumour, although in many parts thinned. The overlying thickened and highly pigmented hyaloid was in parts invaded by the growth. The *iris* was somewhat thickened and abundantly infiltrated throughout with cells. Although, as already mentioned, there was no continuity of structure between the iris and the advancing border of the tumour, yet from the characters of the cells in the iris, I think they are in all probability sarcoma cells and derived from the main tumour; not of an inflammatory nature, and merely due to an increase of the lymphoid corpuscles of the healthy iris. Thus, their average size is larger than that of white blood cells; they are of irregular forms, some even spindle-shaped or fusiform, and some have double nuclei. A few similar cells, some of them highly pigmented, were found in the deepest layers of the corneal circumference close to Descemet's membrane, and some similar groups in the deepest layers of the sclerotic immediately adjoining; with these exceptions, both sclerotic and cornea were healthy. Sarcoma cells were therefore scattered in front of the advancing border of the tumour itself.

There was no evidence in the sections examined (and they were taken through the centre of the scar) of a former perforation of the sclerotic, but immediately behind the sclero-corneal junction the conjunctiva became suddenly reduced to

almost a single layer of squamous epithelial cells, adhering to the outer surface of the sclerotic, an appearance which would be accounted for by the healing of a conjunctival ulceration such as might have followed the injury. It is of course possible that at some other part of the scar-patch evidence of wound of sclerotic might have been found, had the entire scar been cut into thin slices.

The lens capsule was partly shrivelled and still contained some altered lens matter. Its epithelium was present over a considerable extent at and about the equatorial part.

The tumour contained numerous very large blood-vessels.

On *July 6, 1875*, the patient wrote, in reply to a note, that she was in good health and had had no inconvenience or pain since the operation.

CASE II.—*White Sarcoma of the Choroid in a Girl, æt. 12.*

Numerous small Nodular Growths in Choroid and Retina, and commencing Affection of the Iris.

Miss G., a pale flabby girl of 12, was brought to Mr. Hutchinson on *June 1, 1871*, for pain and inflammation of her right eye. It was stated that the eye had been painful for three weeks, and that when the pain began she found she could not see with the eye; but she did not know whether or not it had been blind before. The pain had been almost continual and very severe, "like tooth-ache in the eye."

On admission, the right eye was very intolerant of light and there was some ciliary congestion and corneal haze; a deeply seated grayish reflexion was thrown from the back of the eyeball, but the photophobia made an accurate examination very difficult. The other eye was hypermetropic.

On enquiry, it was stated that a relative of the patient's mother died of cancer. The patient herself was stated to have been ricketty in infancy; and her brothers and sisters had had bad health.

June 21. The photophobia is extreme; much conjunctival and scleral congestion and some swelling of eyelids; cornea clear or very nearly so; iris of gray-blue colour like the other, its margin adherent by one or two points to the lens-capsule; pupil somewhat dilated, rather oval vertically and slightly

irregular. The gray-green reflex seen as before, but she will not allow a careful examination. Tension not accurately estimated owing to the swelling of lids, apparently not increased. The eye is quite blind and the other eye somewhat irritable. The right eye excised at this date.

The optic nerve was cut at a quarter of an inch (6 mm.) behind the globe and its proximal end looked quite healthy. The eye transmitted light. Behind the lens a greenish semi-opaque substance could be seen, and on it a number of opaque yellowish spots, especially abundant at the periphery.

After slight hardening for a day or two in Müller's fluid, the globe was opened in the antero-posterior direction through the cornea and optic nerve. There was no visible disease of the cornea, lens, or optic nerve. *Retina* detached from choroid excepting at the lower-outer part; it was for the most part shrunk into a tube containing a small cord of vitreous; in front it spread out as usual into a diaphragm behind the lens, attached all round at the *ora serrata*, and pressed forwards into close apposition with the ciliary retina and back of lens. The *choroid* showed very remarkable changes; at the lower and outer part about the equator it was converted into an ill-defined tumour a fifth of an inch (5 mm.) thick and with a wide diffused base; the growth adhered intimately to the sclerotic, while its inner surface blended with the retina, which in this part of the eye remained in proper position. The precise limits of the growth were hidden by the retina, but it occupied more or less definitely the lower and outer quadrant, not, however, reaching either the *ora serrata* in front or optic disc behind. The greater part of the remainder of the choroid was seen on section to be very obviously thickened; its cut edge was white. Its inner surface at the lower and outer parts, where the thickening was greatest, was thickly studded over with little spots, the smallest white, the larger ones more or less pigmented at their centre; many of them were slightly prominent, and appeared to be minute nodules of new growth. Around the outskirts of the main tumour, over which the retina was still *in situ*, long strings were stretched from several parts of the outer surface of the detached retina to some of these spots on the choroid; one or two of these appeared just on the point of giving way. On now again turning to the *retina*, it was found that the

whole of the outer surface of its detached portion was thickly studded over with little nodules, the size of small pins' heads, and resembling the white dots on the choroid. Some of these were clean and rounded, others more or less ragged. The *ciliary muscle* at the lower part was decidedly thicker than at the upper part, while on the back of the *iris*, behind its pigment epithelial layer, at the lower part, were two minute white nodules. The iris itself in this region appeared, to the naked eye, somewhat too thick.

From the naked-eye appearances of this eye, there can be little doubt that a morbid growth of some kind began in the choroid, at the lower-outer part, at or about the equator; that it rapidly invaded almost the whole choroidal tract, giving rise to a general white thickening, but with a tendency somewhat later, to the production of little nodules which projected towards the retina; that the retina also became infected, in part by intrusion of the primary choroidal growth, but probably, in part also by direct extension from the numerous secondary choroidal nodules with which it was in contact before it became detached. That the disseminated infection of the retina occurred chiefly while it was still *in situ* is almost certain, from the existence of the strings already mentioned as passing from its outer surface to spots of diseased choroid, proof that when the general separation of retina from choroid took place, morbid adhesions already existed between them at these spots; the raggedness of many of the retinal nodules on their choroidal aspect is also suggestive of the same fact. Some of the retinal nodules, however, appeared quite smooth, and these were probably produced by extension from the other parts of the retina, and a corresponding origin must be assigned to the two little growths on the back of the iris.

Microscopical examination of several different parts gave substantially similar results. The primary growth at the lower and outer part of the globe was composed mainly of rather large cells, of shapes not departing widely from the circular and oval, but variously modified by pressure, and often possessing one, two, or more rather short processes. None were really spindle-shaped. They often contained a nucleus about as large as a white blood-corpuscle. In some parts there were groups or little islands of very large, almost giant, cells, but none of

these contained, so far as seen, more than a single nucleus. The central cells of these groups were loose enough, in some cases, to drop out, having a little central cavity. There were, besides, great numbers of small and perfectly round cells, almost filled by their contained nuclei; these could not be distinguished from young granulation tissue. They were often mixed with the larger cells, but in many parts at a distance from the primary growth and where the disease had made comparatively little progress, by far the greater part of the morbid change consisted in the close packing of the tissue with these indifferent cells. There was no fatty degeneration, nor did the primary growth contain many blood-vessels.

Parts Affected.—At the seat of the primary growth the inner layers of the sclerotic, the choroid and retina were blended together, so as to be scarcely distinguishable. In the innermost layers of the growth, indications of the overgrown connective tissue framework of the retina were distinguishable; deeper down was a much broken line representing choroidal epithelium, while still deeper (*i.e.*, more externally) the growth was intersected by numerous bands of fibrous tissue from the sclerotic. It was in the part representing choroid that the largest cells were most abundant, and it is for this reason, no less than on *à priori* grounds, most likely that the growth began in the choroid. Sections of choroid from several parts of the eye showed everywhere the same condition; more or less increase, often amounting to several times its thickness in health; its tissue replaced almost completely by the new cell-growth; its epithelium often dotted over with little groups of similar cells or with single ones; the epithelial cells, in parts, multiplied and mixed with the sarcoma cells, at other parts lifted up by little nodules of new growth between the epithelium and elastic lamina; in other places again, where the retina was adherent, the epithelium quite absent over considerable spaces, so that the choroidal and retinal growth were here separated only by the elastic lamina of the choroid. I did not anywhere succeed in finding apertures in this membrane, though the appearances were highly suggestive of their being present in some parts. The detached retina was largely infiltrated with sarcoma cells, especially in its outer (choroidal) layers; a section of one of the little ragged nodules already mentioned was composed entirely of the same cells. The sarco-

matous infiltration extended in the choroid and retina quite up to the *ora serrata*. In front of this line sections taken through the ciliary region at the lower and outer part, *i.e.*, as near as possible to the main growth, showed the disease to be continued along the pars ciliaris retinæ and suspensory ligament of the lens to the inner surface of the ciliary processes, and thus to the ciliary margin of the iris. In one section the passage of the growth thus into the iris itself was clearly shown, the uveal pigment being pushed aside and dispersed by the intruding growth, the cells of which were directly continuous with those in the iris. The iris itself consisted chiefly of small round cells, and these caused slight ragged prominences, here and there, on its front surface. Passing outwards the infiltration had reached the loose tissues around Schlemm's canal, and from thence had begun to intrude into the corneal tissue and to creep along the posterior surface of Descemet's membrane. There was also irregular increase of cells on Descemet's membrane, at some distance from the corneal margin, and probably some of these were derived, by direct transplantation, from the iris.

The parts in this region of the eye which were least affected were the ciliary muscle and ciliary processes. In front of the *ora serrata* the infiltration of the choroid rapidly diminished, being confined, even in sections taken as near as possible to the chief growth, to an irregular layer of cells close to the limiting membrane, and even these disappeared at some distance behind the ciliary processes. The tissue of the ciliary processes, including their uveal epithelium and the greater part of the ciliary muscle were quite free from morbid growth. Immediately behind the *ora serrata* the outermost layer of choroid was quite unaffected, being thus sharply distinguished from the inner (much diseased) layer; the continuity of this outer layer with the outermost layer of the ciliary muscle accounted for the absence of any infiltration of the lamina fusca between that muscle and the sclerotic.

A case in some respects resembling this one was published by Knapp and Williams, but there the little growths on the choroid were considered to have been derived from germs disseminated from the outer surface of the detached retina; the latter having been infected by the primary choroidal growth. The patient was 40 years old.—(Archives of Ophth. and Otol., IV, 1, p. 2.)

CASE III.—*Small-celled Sarcoma of the Lacrymal Gland.*

Mrs. Hallett, æt. 42, was admitted under Mr. Lawson's care at Moorfields on *January* 30, 1873, when it was noted that there was proptosis of the right eye, and a firm tumour at the upper and outer part of the orbit. On ophthalmoscopic examination neuritis of the right optic nerve was found. The patient stated that she had first noticed a "lump in the corner of the right eye" about seven weeks before. At about the same time she suffered from aching in the right upper jaw, of moderate severity, for a few days, and the eye itself was painful and gritty. Nine months before admission she had had a "polypus" removed from her right ear. She considered that she had lost flesh lately. She knew most of her relatives and was not aware of any family history of cancer or tumours.

Mr. Lawson made an incision through the upper lid and removed a flattened and somewhat lobulated tumour, between twice and thrice as large as a healthy lacrymal gland, from the upper and outer part of the orbit. No other tumour could be felt further back in the orbit, but the proptosis was not obviously diminished immediately after the operation. The wound healed well and the eyeball gradually receded. There was slight enlargement of a lymphatic gland below the angle of the jaw a few days after the operation, but it soon subsided and was therefore probably only inflammatory. A considerable convergent squint was developed afterwards, due probably to accidental division of the external rectus at the operation.

The tumour was flattened like the lacrymal gland, and more or less lobulated. While fresh all parts of it were somewhat firmer than healthy lacrymal gland, but unequally so, one lobe being almost as hard to the touch as scirrhus. No microscopical examination was made until it had been hardened in alcohol, when thin sections were cut. It was then found to be a small-celled sarcoma, by far the larger number of cells being round, or only slightly fusiform or angular from mutual pressure, some in the older parts being however spindle-shaped. The healthy follicles of the lacrymal gland-structure were present in abundance in some parts, while in others no trace of them was left. The cells were most uniformly round in those parts where the lacrymal gland follicles still remained, *i.e.*, presumably in the newest parts of

the growth. In other parts the cells were packed in the meshes of a reticulum of fine branching fibres, containing nuclei in their nodal points, the remains of the healthy connective tissue of the gland. There was no trace of epithelial growth.

I have lately (*July*, 1875) tried to find the patient, but have failed to trace her, and the final result of the operation must therefore remain uncertain.

A CASE OF ACUTE GLAUCOMA.
WITH REMARKS.

By CHARLES HIGGENS, F.R.C.S.,

Assistant Ophthalmic Surgeon Guy's Hospital.

December 9th, 1874. Catherine P., æt. 62, three weeks ago went to bed in her usual health; during the night was seized with violent pain in the right eye, severe headache and vomiting; in the morning she found that the right eye was quite blind, the pain and sickness, however, had passed off; she fancied she had had a bilious attack, and that the sight would return as she got better. As vision has not improved she came to the Hospital to-day for advice.

The right eye is stony hard ($T + 3$), the pupil dilated and fixed, the anterior chamber shallow and the media cloudy; examination with the ophthalmoscope gives only a dull red reflection; perception of light doubtful.

The left eye appears normal, the ophthalmoscope shows no change, visual field good; v. $\frac{20}{30}$

I admitted her, intending to perform iridectomy in the right eye on the following day.

December 10th. During the night has had a similar acute attack in the left eye; the pain in the eyeball and head were very severe and the vomiting most distressing. The pain and sickness have passed off, but now the sight of the left eye is almost gone; $T + 3$; media hazy; pupil dilated and fixed; she can just distinguish shadows.

An anæsthetic was administered and a large iridectomy performed upwards in each eye; the structures in the right eye were found to be rotten, and some difficulty was experienced in removing the desired amount of iris.

December 14. Both eyes T. nearly normal ; counts fingers.

January 4th, 1875. Some return of increased tension, iridectomy downwards in both eyes.

February 15th. Both eyes T. normal, reads Sn 3 at 18," with ease ; vision of the right eye appears rather the better of the two.

April 10th. L. Eye reads Sn. $6\frac{1}{2}$; R. Sn. $2\frac{1}{2}$; T. n. Good field in both. Some haziness of lens in left.

Remarks.—There are several points of interest in this case.

1st. The acuteness and violence of the attack. 2nd. The immediate, lasting, and almost total extinction of vision. 3rd. The entire absence of premonitory symptoms. 4th. The length of time that the retina was subjected to *extreme* pressure, and yet recovered its function upon the pressure being removed. 5th. The complete success of iridectomy, notwithstanding that a second operation was required. Vomiting and headache are not unfrequent accompaniments of acute glaucoma.

Acute glaucoma, as is well known, may frequently destroy sight in a comparatively short space of time, but it is extremely rare to find such total and lasting blindness produced by a single attack.

As a rule the attack passes off, vision returns to a greater or less extent and may remain stationary for a time ; but if no relief be afforded will be entirely lost, after two or three subsequent outbreaks of the disease. Moreover, certain premonitory symptoms usually make their appearance before an outbreak of acute glaucoma ; patients often complain for some time before the attack of transient obscurations of the visual field, some pain, intolerance of light, coloured vision, inability to continue long at any kind of near work, &c. But in this case no warning was given ; the patient had had no trouble whatever with her eyes until the night on which she lost the sight of the right. As a rule it is not to be expected that vision will return in an eye that has been to all intents and purposes blind for three weeks from acute

glaucoma. As noted in the report, it was doubtful whether the right eye had perception of light or not; when the patient was examined she was uncertain whether the lamp was exposed before the eye, or shaded, or turned nearly out.

When iridectomy was performed in this eye, no very marked result was looked for, excepting a reduction of tension. But contrary to expectation, extremely good vision was restored; indeed the vision of the right eye, which had been blind for weeks, was subsequently better than that of the left, which had only been attacked a few hours before the operation was performed.

A case showing in a more marked manner the efficiency of iridectomy in glaucoma could hardly have occurred, the patient was certainly rescued from complete and irremediable blindness by its performance.

CURATOR'S PATHOLOGICAL REPORT.

By WM. A. BRAILEY, M.D.,

Curator of the Royal London Ophthalmic Hospital Museum.

The following tables contain a statement of all eyes removed on account of injuries during the first six months of the year 1875. Some account is given of the symptoms preceding the excision, and also of the principal pathological changes observed. No results of microscopical examination are here recorded, because some of the specimens are described in full among the cases following these tables, and others are awaiting examination and will be described in another report. Those cases that exhibit no pathological change of any microscopical interest will not extend beyond the summary given here.

Tabular Statement of Cases in which Eyes have been Excised for Injury, from 1st January to 30th June, 1875.

TABLE I.—*Eyes containing a Foreign Body.*

No. of Case in Register, Name, Age, Date of Excision, and Name of Surgeon.	Nature of Accident.	Time between Accident and Excision.	State of Injured Eye since Accident and at time of Excision.	Changes found in Eye after Excision.
453. Joseph Beecroft. Æt. 24. Jan. 19, 1875. Mr. Critchett.	While striking a file, a fragment flew and struck him in the eye.	5 weeks nearly.	<i>At date of excision</i> , traumatic cataract. Great congestion of globe. T + 2. Iris pushed forwards against cornea. Pupil small and closed by lymph. Small scar in centre of cornea.	Retina detached, except in front and from disc, and from the choroid just internal to disc, where there is a patch of choroid devoid of pigment. Here also choroid closely adherent to sclerotic, and in retina at this point is found a small fragment of iron.
449. Chas. Rawlings. Æt. 21. Jan. 8. Mr. Hutchinson.	Spark from edge of hammer.	3 years, 3 months.	Scarcely any pain, but very gradual deterioration of sight till a few days before excision, when inflammation, pain, and no p. l.	Foreign body, a scale of iron, imbedded in outer part of back of lens capsule, at junction with ciliary processes. Cornea and lens clear.
475. Richd. Harvey. Æt. 21. Feb. 5, 1875. Mr. Lawson.	Fragment of steel ..	5 months.	<i>After accident</i> . Prolapse of iris through small wound extending into ciliary region. Lately pain and fog before other eye.	Total separation of retina.
493. William Hall. Æt. 21. Feb. 25. Mr. Streetfeld.	Fragment of iron from hammer.	18 days.	No history.. ..	Retina detached and pulpy. Vitreous opaque and full of blood.

510. Alf. Reynolds. Æt. 22. April 2. Mr. Couper.	Fragment of steel from hammer.	4 months.	Painful seven days	Shrunken eye. Sclerotic and choroid thickened. Vitreous space scarcely traceable.
513. Dennis Murray. Æt. 51. April 13. Mr. Critchett.	Bit of steel from a punch.	10 years.	After accident painful seven weeks. P.L. for one year, then quite blind. Painful during last ten weeks. T +. Other eye affected after the accident, but has since got quite well again.	Retina umbrella-shaped, and ad- herent to choroid at one point only, where foreign body found.
525. Joseph Kirby. Æt. 30. May 10. Mr. Hutchinson.	Bit of metal from a tool, with which he was cutting red-hot iron.	5 days.	At time of accident. Wound of cornea, round hole in iris. Sight dim, large floating black patches before it. May 10, large hypo- pyon. Large anterior synechia.	Pus and recent blood, close to ciliary processes, at point where foreign body found. Vitreous separates readily from retina be- hind, which is covered with a layer of soft, reddish-yellow, vel- vety lymph.
529. Robert Green. Æt. 30. May 11. Mr. Couper.	Bit of steel flew from a punch which he was striking.	5 days.	P.L. for thirty-six hours after accident. Much pain till the excision. Lens clear. Pan- ophthalmitis. T -.	Scale of iron found on ciliary processes at lower part of eye. Vitreous purulent near the foreign body. Separates readily from retina behind. On free retinal surface dots of blood and pus.
530. George Allen. Æt. 20. May 11. Mr. Couper.	Bit of steel from a punch.	5 days.	Lens clear. T -. Panophthal- mitis.	Vitreous as in 529. Ciliary pro- cesses covered with lymph.
551. William Turner. Æt. 21. June 19. Mr. Wordsworth.	Fragment detached from hammer, $\frac{1}{4}$ -inch broad, 1 line thick.	10 weeks.	After accident. Painful, and flashes of light. Hæmorrhages into globe at excision. Iris wanting on one side. Cornea and lens clear.	Retina entirely detached. Just inside retinal cavity, and near ciliary processes, the foreign body was found.

TABLE II.—*Eyes Ruptured or Penetrated, but no Foreign Body found.*

No. of Case in Register, Name, Age, Date of Excision, and Name of Surgeon.	Nature of Accident.	Time between Accident and Excision.	State of Injured Eye since Accident and at time of Excision.	Changes found in Eye after Excision.
448. Elizab. Hagley. Æt. 42. Jan. 15. Mr. Streatfeild.	Injury from a fork while drawing up a shoestring which broke. Blow with piece of wood.	9 days .. 2½ weeks ..	<i>After accident.</i> Perforation of cornea. Iris torn. Eyeball half full of blood. No p. l. <i>At excision.</i> Hypopyon. Painful. Dec. 20. Traumatic cataract. Severe iritis. T + 2. P. l. good, not much pain. Paracentesis. Jan. 1, large staphyloma above cornea. Globe tender, congested, lachrymation.	Large blood-clots in vitreous, apparently proceeding principally from a point near optic disc. Lymph on back of lens capsule. Pupil blocked by lymph. The part of vitreous just behind lens capsule forms a greenish glassy mass.
452. John Cook. Æt. 13. Jan. 1. Mr. Lawson.	Gunshot	3 months ..		Shrunk globe, &c.
468. David Emmanuel. Æt. 14. Feb. 1. Mr. Streatfeild.	Wound with stick ..	9 days ..	At excision. Hypopyon. Cornea infiltrated with pus.	Lens absent. Vitreous is greenish yellow and semiopaque.
480. Wm. Bumpus. Æt. 28. Feb. 12. Mr. Bowman.	Old gunshot injury ..	8 years ..	Globe shrunken. Transverse opacity across front of cornea. Removed for appearance.	<i>Lens</i> calcareous and opaque. <i>Retina</i> detached. Fluid between retina and choroid full of cholesterol crystals. Ring of bone round optic disc. Vitreous filled with blood.
481. James Taylor. Æt. 4. Feb. 15. Mr. Streatfeild.	The patient cut his cornea across with a knife.	9 days ..	Wound extended all across cornea into ciliary region on each side. At excision eye shrunken and soft.	

483. George Peck. Æt. 14. Feb. 16. Mr. Couper.	The cornea was ab- scised six years ago, reason now unknown.	6 years	..	Present condition. Eye shrunken. No trace of cornea. <i>Other eye</i> has cornea nebulous. V. = $\frac{20}{30}$. Lateral nystagmus. <i>Nov.</i> Staphylomatous bulging of sclero-corneal junction at seat of wound. Irido-choroiditis, painful. Globe open in front. Collapsed. Cornea absent.	No lens. Bony cup on interior of choroid. Retina and vitreous form a pulpy mass.
488. Joseph Davies. Æt. 24. Feb. 20. Mr. Hulke.	Wound when æt. 8 from smashing a marmalade jar in his play. Globe ruptured by handle of mangle.	16 years	..	<i>Nov.</i> Staphylomatous bulging of sclero-corneal junction at seat of wound. Irido-choroiditis, painful. Globe open in front. Collapsed. Cornea absent.	Retina umbrella-shaped. Reddish- brown fluid between retina and choroid. Lymph on ciliary pro- cesses at seat of wound. Blood-clots between sclerotic and choroid. Retina soft, hardly recognizable.
491. Ann Farquhar. Æt. 59. Feb. 23. Mr. Bowman.	Globe ruptured by handle of mangle.	13 days	..	<i>On next day.</i> Wound of ciliary region. Iris prolapsed. Ante- rior chamber full of blood.	Blood between sclerotic and cho- roid. Bloody serum between choroid and retina. Retina funnel-shaped. Vitreous in front part of its cavity only, and greenish-yellow.
492. Arthur Caudle. Æt. 17 months. Feb. 25. Mr. Hutchinson.	Fell and struck eye against broken cup.	8 days	..	<i>At excision.</i> Penetrating wound at lower and outer sclero-corneal junction. Iris prolapsed. Pupil linear, painful. Tension —. Lens opaque. Ciliary conges- tion.	Choroid deficient in pigment below yellow spot and above disc. Retina transparent. Ciliary pro- cesses woolly. Vitreous thin, clear.
509. Benjamin Higgins. Æt. 73. April 1. Mr. Hutchinson.	Eye pricked by a thorn in hedging.	6 weeks	..	Painful for a few days after acci- dent, then p. l. <i>Now</i> no pain, no p. l. Panophthalmitis. Iris muddy. Hypopyon. Chemosis. Scar on inner side of cornea. Globe shrunken in last two years. Squared. Painful and watery for last six months. <i>Other eye</i> inflamed six months.	Vitreous yellowish-green. glassy, except near seat of wound, where white and curdy. <i>Retina in situ.</i>
511. Samuel Judd. Æt. 52. April 5. Mr. Hutchinson.	Puncture of globe with fork while un- doing a boot.	8 days	..	Painful for a few days after acci- dent, then p. l. <i>Now</i> no pain, no p. l. Panophthalmitis. Iris muddy. Hypopyon. Chemosis. Scar on inner side of cornea. Globe shrunken in last two years. Squared. Painful and watery for last six months. <i>Other eye</i> inflamed six months.	Vitreous yellowish-green. glassy, except near seat of wound, where white and curdy. <i>Retina in situ.</i>
512. Thomas Sturton. Æt. 55. April 8. Mr. Couper.	Wound by fork when æt. 4.	51 years	..	Painful for a few days after acci- dent, then p. l. <i>Now</i> no pain, no p. l. Panophthalmitis. Iris muddy. Hypopyon. Chemosis. Scar on inner side of cornea. Globe shrunken in last two years. Squared. Painful and watery for last six months. <i>Other eye</i> inflamed six months.	Bony cup on interior of choroid.

TABLE II.—*Eyes Ruptured or Penetrated, but no Foreign Body found—continued.*

No. of Case in Register, Name, Age, Date of Excision, and Name of Surgeon.	Nature of Accident.	Time between Accident and Excision.	State of Injured Eye since Accident and at time of Excision.	Changes found in Eye after Excision.
517. Hannah Smith. Æt. 38. April 23. Mr. Couper.	Blow with piece of wood.	4 days	Great pain ever since accident, both night and day. Wound in centre of cornea filled with soft lymph.	Ciliary processes covered with a thick opaque, white mass. Choroid soft, brown, apparently thickened. Retina not recognizable.
518. George Barr. Æt. 6. April 23. Mr. Couper.	He cut across his cornea with scissors while at play.	11 days	<i>Next day.</i> Traumatic cataract. Eye much inflamed. Iris discoloured. April 17, panophthalmitis.	Choroid thickened, soft, brownish in colour; blood between it and sclerotic. Retina detached, cavity filled with blood. Soft bloody lymph protrudes from the wound.
522. Benjn. G. Neal. Æt. 30. May 3.	Wound by gun-cap ..	14 years	Quite blind for ten years. Painful only during last week. Linnear scar at sclero-corneal junction. Pupil partly movable.	On ciliary processes there is effused blood and a white opaque tough substance, which extends partly over the back of capsule of the lens. Only remains of lens, a calcareous scale. <i>Choroid</i> slaty-blue in colour, mottled with black. <i>Retina in situ.</i> It carries with it a little black pigment.
538. William Rook. Æt. 5. May 29. Mr. Hulke.	Wound by an arrow..	Nearly 7 weeks	<i>Same day.</i> Small prolapse of iris, returned into anterior chamber. Third day. Suppurative iritis. Sight lost.	Between sclerotic and choroid a tough gelatinous mass of fibrous tissue. Cavity of choroid small. Retina not recognizable. Re-

539. Joseph Elliot. Æt. 18. May 31. Mr. Hutchinson.	Eye injured by a piece of steel, January 5, 1875. Says that it was removed the same day.	5 months	..	May 27. Eye shrunken, tender, congested. Other eye inflamed and iris dull. May 18. Much ciliary conges- tion. No pain. T —. Mark of the wound at sclero-corneal junction. Near this, on sclero- tic, blue tortuous veins. <i>Other</i> <i>eye</i> sympathetic ophthalmitis. Iris vascular. Affected ten weeks. Now only counts fingers. Posterior synechia. Globe ruptured nearly round margin of cornea. Lens escaped. Wound filled up with soft lymph. T. —. Cornea clear. T. —. Pupil medium size.	mains "of vitreous are semi- opaque. Vitreous fluid. Fibrous-looking opaque substance over ciliary processes and back of lens cap- sule. Choroid round equator more deeply pigmented and mottled with minute white dots. Hæmorrhage under retina near yellow spot. Retina hazy near disc. Elsewhere clear. Retina soft, scarcely recognizable.
549. John Stower. Æt. 70. June 18. Mr. Bowman.	Blow from hammer, rupturing globe.	3 weeks	..		Retina funnel-shaped, soft, but transparent. <i>Vitreous</i> front half forms a greenish-yellow, glassy globe on back of lens capsule and ciliary processes. Optic disc covered by a small opacity, apparently made up of fibres, entangling among them pus cor- puscles.
552. John Johnson. Æt. 63. June 25. Mr. Couper.	Thrust from an awl..	4 weeks	..		

TABLE III.—*Eyes lost by Non-penetrating Wounds, Blows, or Scratches.*

No. of Case in Register, Name, Age, Date of Excision, and Name of Surgeon.	Nature of Accident.	Time between Accident and Excision.	State of Injured Eye since Accident and at time of Excision.	Changes found in Eye after Excision.
446. Geo. Ferguson. Æt. 50. Jan. 14, 1875. Mr. Critchett.	Spark from chisel which he was striking.	9 weeks ..	At excision almost complete staphyloma of cornea. Lens transparent and <i>in situ</i> . Anterior synechia.	Vitreous fluid. Retina normal. Choroid presents several atrophic and one very small deeply pigmented patch near the macula.
490. John Brock. Æt. 36. Feb. 24. Mr. Soelberg Wells.	Eye injured fourteen years ago with glass. Sight recovered perfectly, but eye remained liable to inflammatory attacks. Blow from fist fourteen days ago.	Last injury 14 days.	At excision. Staphyloma of sclerotic near corneal margin. Eye full of blood. No p. l. Opaque band across cornea.	<i>Sclerotic</i> very thin. <i>Vitreous</i> fluid; contains several streaks of blood-clot. Lens <i>in situ</i> , very soft.
500. David Miller. Æt. 25. March 11. Mr. Hutchinson.	Was bending an umbrella-rib in play; it broke, and a fragment struck him in the eye.	20 years ..	<i>At excision.</i> Globe large. Soft. Old staphyloma of cornea. Eye removed because the other has ached lately after slight use.	Vitreous fluid. Disc deeply cupped. Pigment above disc sometimes deep in colour, occasionally deficient. Iris very thin; has gaps between its radiating fibres. White calcareous substance at upper part of ciliary processes.
505. William Feaver. Æt. 13. March 18. Mr. Hutchinson.	An awl snapped, and a piece 3 inches long struck him in the eye.	9 months ..	Pupil closed. Iris adherent to remains of lens and to cornea at seat of wound. Eye irritable and tender.	Eye shrunken. Squared. T. —. Lens softish and partly opaque. Retina detached.

507. Charles Archer. Æt. 63. March 22. Mr. Bowman.	Blow from piece of wood twelve years ago. Second similar blow two weeks ago. Blow from fist ..	2 weeks from last injury. 12 months ..	Pupil widely dilated. <i>Lens</i> opaque. Globe squared and shrunken. T. +.	Bony cup on interior of choroid.
514. Elizab. Linton. Æt. 59. April 21. Mr. Wordsworth.	Blow from twig while hedging. Blow from twig while hedging. ..	38 days ..	<i>Lens</i> dislocated. T. + 3. Sight failing six weeks. Occasional pain since blow. Great pain six weeks. Myopia. No <i>p.l.</i> for last fourteen days. Much pain after accident and at intervals since. March 25, Traumatic iritis and cataract. T. +. Good <i>p.l.</i> April 1. Great pain.	Posterior staphyloma. Pigmen- tary changes round equator, pig- ment deficient in patches or lines.
515. John Hoare. Æt. 56. April 22. Mr. Hutchinson.	Accidental abrasion ..	Unknown ..	Corneal ulcer, followed by shrunken and disorganized globe. Very painful since injury. At excision no <i>p.l.</i>	Vitreous full of pus corpuscles and detached from retina. Dots of pus scattered on retinal sur- face. Dotted deposits arranged in a triangle on posterior surface of cornea.
519. John Trice. Æt. 39. April 24. Mr. Hulke.	Prick with thorn ..	13 weeks ..	Pupil small and irregular. Pos- terior half of vitreous fluid and contained much blood, which is bright red near disc. Much blood between choroid and sele- rotic at equator.	Sclerotic thickened. Choroid brown, thick, and soft. Retina and vitreous form a small bluish- white opaque substance, the centre of which is calcareous. Vitreous fluid. Retina milky near disc. <i>Yellow spot</i> very dark in colour.
527. John Smith. Æt. 66. May 11. Mr. Hutchinson.	Sting of bee twenty years ago. Earthy lens, removed by Brussels' extraction, March 27.	9 weeks after extraction.	Before extraction. Earthy lens. T normal. Field complete. Perception of light. Upper $\frac{2}{3}$ of iris removed in extraction. April 7. Severe iritis. Other eye since inflamed and very painful.	
540. William Scott. Æt. 42. June 2. Mr. Bowman.				

435. *Enquiry into the Nature of a Mass removed from the front of the Cornea by Mr. Couper.*

A. D., æt. 43, single. In her right eye she has posterior synechia and a capsular opacity.

There is a history of some inflammatory attack in it twelve years ago, since which date the vision has been very defective. Now she barely counts fingers with it.

Some inflammatory symptoms occurred first in the left eye six years back, after which it recovered to be again attacked three and-a-half years ago. Now vision with it = $\frac{20}{200}$. Tension —. There is a ciliary staphyloma at the lower part, with a large opacity caused by a white opaque mass on the free corneal surface. All but the lower quarter of the pupil is free and mobile. After removal of the opacity, an examination shows it to have no microscopical structure and not to react for any metallic compound. With nitric and hydrochloric acids it gives reactions for albuminous substances.

The patient has never used to this eye any local application whatever.

432. *Case showing the Microscopical Structure of Material found in the Anterior Chamber of an Eye injured many years ago.*

Emma Meeks, æt. 25, servant maid, under care of Mr. Wordsworth.

History, &c. Her general health is good. Eyes blue. Hair light coloured.

Her eye-sight was good till seventeen years ago, when she received a blow on her left eye from a stone. For six months the eye was bad and tied up, and though during this time she could discern light from darkness, yet at the end it was entirely blind. After that, except for occasional attacks of inflammation and pain in and around the eye, it was quiet till four months ago. Then, after an attack which was not more severe than usual, she noticed a change in the look of the eye, and this change has been going on since, notwithstanding that since then she has had no inflammatory attack. These used to come two or three times yearly and she attributed them to cold.

She now asks for the excision, simply on the ground of personal appearance.

Tension + 2. No perception of light.

The eye was excised November 28, 1874. A vertical antero-posterior section shows the retina to be detached except from the optic disc and the ora serrata, and a brownish-yellow fluid to be contained between it and the choroid. The lens is imperfectly transparent, with a brownish nucleus. The cornea is uniformly thick and free from opacities. The anterior chamber is filled round its circumference with a yellowish material, which in front ends abruptly at the posterior elastic lamina to which it is so closely adherent that on teasing the two separate together from the cornea proper. The epithelium of the aqueous humour is absent. *Microscopically* the yellowish material is almost continuous behind with the iris, in the neighbourhood of which it contains a little scattered pigment; in front it presents an obscurely laminated or fibrillated structure, the laminae being arranged nearly perpendicularly to the posterior elastic lamina. The front also presents a few very rare pigment cells, and nuclei, generally spindle-shaped and stained by log-wood, are scattered throughout the mass. It is very tough and resists teasing, but with much trouble it can be torn into fibres, which are large but have their edges fringed with smaller fibres; all these swell up and lose their defined outline under the action of acetic acid.

The conjunctival epithelium is not squamous, but the cells stand out as distinct processes. Some of these are long and slender, others short and stumpy. They all contain well-marked nuclei.

469. *Case showing the Microscopical Structure of the Trephined Apex of a Conical Cornea.*

F. W., æt. 24, clerk, under care of Mr. Bowman.

A pale complexioned man, but he says he has generally good health and is physically strong. He is a teetotaler.

History, &c. He has been shortsighted for many years, but did not notice anything particular till early in September, 1871, when he accidentally found that his left eye was very defective, for he could only read with it at about the distance of an inch.

He was soon after seen by a surgeon and then the left corneal apex was found to be nebulous. Things remained in the same

condition till March 18, 1875, when, after exposure in the train, the same eye inflamed and became very painful. These symptoms have now subsided but there is still some injection.

When he came here on March 26, 1875, the left cornea was conical. Its apex presented a central bluish-white opacity, with a rough, soft, apparently vesicated surface. There was still some ciliary injection, but there was pain only when the lid touched the rough surface. Reads J. 16 at one inch only. The right eye has normal tension. Its cornea is clear, but slightly conical at apex. $V. = \frac{20}{100}$, but with an aperture about one line in diameter, $V. = \frac{20}{40}$. Without the aperture he reads J. 1 at 7 inches. Round the ciliary region of this eye there is a vascular zone. The sight is only deteriorating very slightly, but he has notes.

April 2. *Left eye.* An elliptical vertical piece of the cornea was removed through the centre of the cone and a stitch was put in. Iridectomy downwards and inwards was also done. No irritation followed.

April 26. *Left.* Tension normal, reads J. 14 at 3 inches.

May 17. With *left* reads J. 16 at 6 inches, or J. 8 at 2 inches. A vertical cicatrix exists down the centre of the cornea. The iris is wanting on the lower and a little on the inner side.

June 29. *Left* with $-\frac{1}{8}$, $V. = \frac{20}{100}$. Without the glass $V. = \frac{20}{200}$ badly, reads J. 1 at 3 inches.

Jan. 26, 1875. *Right eye.* Three days ago sudden opacity of the whole corneal cone came on, reads only J. 19 at 2 inches. Field complete. T. — 1. With *left* reads J. 1 at 3 inches.

Feb. 2. R. trephined to-day. Anterior chamber opened.

Feb. 5. Now good anterior chamber. Some injection. No anterior synechia. No pain. Feb. 9. Anterior synechia below. T. — 1. Feb. 12. Anterior synechia divided. Feb. 16. T. — 1. Good anterior chamber. No adhesions. He has not been seen since.

On microscopical examination in water of the trephined piece (from right eye) immediately after the operation, it is seen to be made up, as to its deeper portion, of the lamellar tissue of the cornea, superimposed upon which is the anterior elastic lamina, which bears on its front surface the epithelial cells of the conjunctiva. The deepest epithelial cells are *in situ*, but the round ones superficial to these are wanting in one place, so as to

leave an interspace or gap, the roof of the interspace being formed by the more superficial flattened epithelial cells. (*See figure.*)

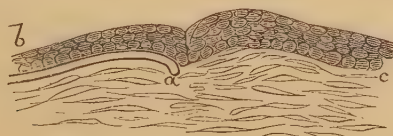


Cavity in the Epithelial layer covering the Apex of a Conical Cornea.— $\times 220$.

Note by Mr. Bowman.—When the apex of the cone at a certain stage becomes opaque, it is further liable after a time to have its anterior epithelium thickened, rough, elevated, and even detached in flakes, and to become a source of irritation for the first time. The specimen seems to show that such elevation may consist of a separation of the superficial from the deeper layer, a small cavity being formed between them.

486. *Microscopical Examination of the recently Trephined Apex of a Cornea, showing the results of a previous Trephining.* (*See figure.*)

M. W., æt. 26, female, under care of Mr. Bowman.



$\times 110$.

Note by Mr. Bowman.—This figure is taken from a vertical section through a portion of cornea removed by a trephine on February 9, 1875, *b* is the margin of the specimen cut by the trephine.

The anterior epithelium, the anterior elastic lamina, and the superficial lamellæ are each seen as far as *a*, where the anterior elastic lamina ends abruptly, the epithelium and lamellated tissue continuing. The explanation of this is, that by an operation with the same sized trephine, fifteen months previously,

the epithelium, the elastic lamina, and the lamellated tissue from *a* to *c* (and beyond this to the opposite side of the circle not here represented) have been excised and only the epithelium and lamellated tissue reproduced in the cicatrix. The anterior elastic lamina does not seem to have been reformed.

It is also seen that the cicatrix resulting from the excised tissue is a contracted one, inasmuch as the same sized trephine, viz., of $2\frac{1}{2}$ m.m., has, at the second operation, included the cicatrix and a portion of the clear cornea all round. The second operation was undertaken to complete the reduction of the cone only partially effected by the first.

535. *Case of Microscopical Examination of the Apex of a Conical Cornea, Trephined by Mr. Lawson.*

S. W., æt. 24, single, parlour maid. She is a pale, delicate looking girl, with red hair, a low forehead, a narrow chin, a flat bridge to her nose and a particularly white skin. She has been near-sighted since childhood. For the last few years the sight has got closer, and she has been troubled with black specks.

The *left* eye was trephined three months ago, with marked benefit, for before the operation it was the worst, and she had to hold any print quite close in order to read with it, whereas now she reads J. 2 at 8 inches. The *right* eye was trephined on May 24, 1875, nearly down to the posterior elastic lamina. The crown of the trephine was .3 mm. in diameter.

Microscopical Examination of the Apex of the Cornea.—The epithelium of the corneal surface is thicker in the centre than towards the circumference of the trephined piece; the nuclei are well marked and the cells seem to be elongated almost solely in a horizontal direction. The anterior elastic lamina is entire. The lamellar tissue towards its centre has its nuclei much drawn out at the ends. They are finer, rarer, and more irregular in their distribution than in the normal cornea. Towards the circumference the nuclei are more regularly distributed, and more numerous. Their long axes lie for the most part in a horizontal direction. No interspaces among the epithelial cells can be detected in any of the sections.

437. *A case of long-standing double anterior Synechia, of which a drawing has been made for the Museum, occurring after Ophthalmia early in childhood, the shape and position of the adhesion being almost exactly symmetrical in the two eyes.*

The patient is a girl now æt. 21, under care of Mr. Streatfeild.

In each eye the iris, where it forms the lower and slightly inner margin of the pupil, is prolonged into a pointed process, whose base is continuous with the rest of the iris, while its apex is attached to the centre of the posterior surface of the cornea. A slight bluish-white corneal nebula marks this point of attachment. The margin of the pupil acts freely. There is a slight internal strabismus of the right eye. The only history is that the eyes were quite right at birth, but that, at the age of nine weeks, they were bad with a discharge of matter. The girl makes no complaint, except that the vision is a little defective. She was operated on for the strabismus, and discharged from the hospital with her synechiæ untouched.

425. *Perforating wound of all Tunics—Excision of Eyeball containing the foreign body 35 years after the date of entry.*

Previous History.—Edwin C., æt. 48, right eye excised Sept. 18, 1874, by Mr. Couper. When æt. 13, while standing near a shoemaker at work, something flew off from the striking and hit him in the right eye. No foreign body was found at the time, but a scar was noticed on the front of the eyeball, which appears to be the same as the one described below. His work, that of toy-making, with intervals during which he made fireworks, has never exposed him to being struck by fragments of metal, &c., at any time, nor does he ever remember any accident to the eye since the one above described. Eight years ago, *i.e.*, 27 years after the accident, the first symptom which drew his attention to the eye came on, *viz.*, a smokiness before it without any pain. From that date the sight very slowly faded, till at length he became quite blind of this eye. Three years after this the eye began to be occasionally irritable and slightly painful. These symptoms have returned occasionally since, and seem to have been more marked lately, and the eye was therefore excised. The other eye has never suffered.

Examination of eyeball after excision. T. +. Iris tremulous.

On the exterior of the globe, beyond the outer margin of the cornea, a slight scar is seen. This corresponds with a spot on the interior of the globe, just external to the ciliary processes, which is translucent. On the internal surface of the posterior half of the globe, to the outer side of the optic disc and midway between it and the equatorial line, is seen a dark spot of pigment, and projecting from near its centre a small semi-transparent process of organized lymph. Directly below this, in the line of gravity, is a patch devoid of pigment, except that a few very small dark specks are scattered about, in the centre of which the foreign body was found lying unattached. The *retina*, *choroid*, and *vitreous* appeared in all other places healthy.

It would appear as if the foreign body, which was found to be a small piece of iron, remained attached for a long time to the pedicle of lymph, till, from some cause, it became detached, and, falling down, set up irritation in the eye.

442. *Case of Cyst formed by separation of the Lamellæ of the Cornea, probably in the seat of an old leucoma.*

Emily H., æt. 30, under care of Mr. Hutchinson.

History.—An explosion of gunpower, twenty years ago, injured her face, right arm, and hand. Scars remain now on her forehead and left eyebrow, and the bridge of her nose is destroyed. After the accident she was blind of both eyes for a fortnight. Then she got better, and thought she had sight in both. She never noticed any deficiency till two years ago, when, on her friends drawing attention to a difference in colour between the eyes, she found that she was totally blind of the left. Her schoolfellows had long before told her that she had different coloured eyes, but she then thought nothing of it. There was no other trouble with the eye till four months ago, when a small, white, shining speck appeared on the lower part of it; this increased in size very quickly till, in two months, it formed a projection beyond the margin of the lids, and since then it has gone on increasing. Three or four weeks ago there was considerable pain for a short time, but it has now ceased.

On the day of excision, January 7th, 1875, the upper $\frac{1}{3}$ of the cornea was somewhat steamy, but otherwise nearly normal. The lower $\frac{2}{3}$ presented a semi-transparent, rather pearly looking,



bulging, covered by rather rough looking epithelium, which contained a few transparent and easily ruptured vesicles. Sensibility of the part seemed diminished, but by no means absent. A zone of ciliary redness corresponded with the bulged part, but along the remaining circumference of the cornea a slight blush only extended. T. rather increased. No p. l. The eye was, *after excision*, cut longitudinally through optic disc and corneal centre, the section dividing the cyst. The *vitreous* was extremely fluid, the *retina in situ*, and apparently normal. The *choroid* exhibited marked changes. There was atrophy of its pigment, chiefly at the outer side, just behind the ora serrata, and at the corresponding place on the inner side similar slighter changes were seen. At one spot, just on the inner side of the optic nerve entrance, there was slightly increased dotted pigmentation. The *iris* was apparently healthy, as was also the lens. The *cornea*, in the upper part, appeared to be healthy. Then its thickness gradually increased downwards, till the margin of the bulged portion, where it attained its maximum. From this point downwards it was divided into two layers, of which the posterior was thin, while the anterior was of the thickness of the normal cornea, and semi-opaque. The two layers formed between them a sort of cyst or cavity, which extended nearly to the lower margin of the cornea and corresponded to the bulging on its surface.

Microscopically.—Vertical sections of the cornea, including the part involved in the cyst, show that the conjunctival epithelium is thicker towards the lower corneal margin, and that its deepest cells are increased in number, so as to form irregularly conical projections which depress the anterior elastic lamina; the latter is at times wavy and interrupted in its course. The lamellar tissue exhibits a tendency throughout its entire thickness to have spindle-shaped empty spaces between its constituent lamellæ, and this tendency is more marked towards its deeper parts. The posterior wall of the cyst is formed by a thin layer of deep corneal tissue, having on its posterior surface the membrane of Descemet and the epithelium of the aqueous humour. The nuclei of the cornea proper are more abundant than usual, especially where the separation into layers occurs.

515. *Case of unusual Inflammatory Changes in Vitreous and Retina, together with Keratitis Punctata, after an injury.*

John H., æt. 56, labourer, under care of Mr. Hutchinson.

His account is that, on the evening of March 16, 1875, while hedging, a twig struck him in the left eye. He had much pain at the time, and that night he got no sleep, on account of aching pain. On the three following days he worked as usual, but on the fourth day (Saturday) he went to Guildford dispensary. From then till he came here the pain continued much the same.

Diagnosis, &c.—On admission, March 16, 1875, there was, in the *left eye*, traumatic iritis and cataract. T. +. Aqueous dull. Cornea steamy. Good p. l. A mark, probably the scar of the wound, was seen at the upper part of the cornea. The *right eye* sees J. 1 with a glass. On March 29, the globe was much congested. The iris was very much discoloured, but not vascular. The pupil was irregular in shape and of medium size. Anterior chamber somewhat shallow. Still p. l. Much pain at night. April 1st. Pain relieved by leeches. Some chemosis. Iris clear. No sleep. April 15th. Much pain still. Some chemosis. April 22nd. Eye excised to-day.

After the excision, the unopened globe was found to exhibit, on the posterior surface of the cornea, a number of spots, so distributed as to form a cone, of which the apex nearly reached to the centre of the cornea, while the base rested on the lower circumference. A very few more scattered similar spots were seen near the inner margin of the cornea. On the conjunctival epithelium, just inside the upper corneal border, were seen a few blood-vessels. On an equatorial section, some fluid escaped from the cavity of the globe. The retina was *in situ*, and studded with yellowish-white nodules, which were mostly a little smaller than pins' heads, though some were considerably larger. Running forwards from the optic disc was a cord which, expanding anteriorly into a funnel, was united there to the back of the lens capsule. This represented the *vitreous*, and from the cord-like part of it hung down several filaments, each of which supported, as a stalk does currants, one or more globules similar to those studding the interior of the retina. The *cornea* was left in position till May 11th, when on its removal, its lower

part was found covered, on the inner surface, with a thick layer of whitish-yellow substance, rather like coagulated lymph. This was thicker below where some parts of it adhered closely to the cornea, while others separated readily leaving it smooth. At the upper part of the cornea, a layer of the same substance existed, though it was here less consistent and adhered more closely to the iris. Sections through parts of the cornea from which the material in the anterior chamber has not separated, show that there is no deviation from the normal structure till we come to the posterior surface, where we find, as usual, the single layer of epithelium of Descemet's membrane. Lying upon this there is a network of very fine fibres, unstained by logwood, and enclosing in its meshes some nucleated cells. This network sometimes forms a continuous layer, but more frequently separate globes, which contain rather numerous cells. They sometimes, whether globes or a continuous layer, are in such close relation with the epithelial layer as to appear to be simply a multiplication of its cells, but more frequently the two are divided by a little gap. Sections through the *retina*, and the nodules lying on it, show the rods and cones to be replaced by an unstained layer, having no visible structure, and the outer and inner granular layers to be not much altered. The nerve-cell and -fibre layers are about equal in thickness to the rest of the retina, and show the cut orifices of blood-vessels near their inner surface. Stained nuclei, possibly of nerve-cells, can be seen, but no nerve-fibres can be made out. The inner boundary of the retina is clearly distinguishable, except where a mass of closely-packed bodies, rather like the retinal granules, lies upon it. These masses are sometimes defined from the retinal structures by a difference in their shade, but at other times the two appear to run into one another without any definite line of demarcation between them. The nodules hanging to the altered *vitreous* have the same structure as those of the retina, and the funnel-shaped vitreous already described has the same microscopical appearance.

503. *Case showing the Pathology of Colloid degeneration of the Choroid and of Striæ running horizontally across the front surface of the Cornea.*

Ellen W., æt. 11, under care of Mr. Bowman.

Her right eye appears to have been lost through some form of ophthalmia, for which she is said to have had an operation performed elsewhere, when two months old. Her mother also declares that the patient could see till then, but that the operation destroyed the sight, and "turned" the colour of the eye. It has lately been painful. *On admission* here shortly before the excision of the right eye, the *left* was found to read J. 1 at 14 inches, and the *right* to have T. + 2, and to present no scar of a wound anywhere, but there were seen, running across the front of the lower half of the cornea, some transverse bands or lines, apparently superficial and calcareous. The media behind the cornea were opaque. The *right* eye was excised March 16th, 1875. The eyeball was, *after the excision* divided longitudinally, and the retina was seen to be detached everywhere, except from the optic disc behind and from the ora serrata in front. Its posterior part has simply the appearance of a thin cord, and its anterior part is folded in so abruptly from the ora serrata as to lie parallel with the posterior layer of the lens-capsule till it reaches its centre, where it becomes continuous with the cord-like remainder of the retina already described. The lens-capsule contains scarcely any remains of the shrunken and opaque lens. At the lower part of the eye the *choroid* appears, for a short space, to be less pigmented than elsewhere. Generally, over its whole surface it appears to have undergone the colloid change.

Microscopical Examination of the Cornea.—Sections cut at right angles to the direction of the striæ on its surface ($\times 423$) show that the conjunctival epithelium presents, at places, an increase in the number of its cells, while here and there the anterior elastic lamina is depressed so as to give room for them, while the level of the free surface remains the same throughout. The deeper cells are oval, their long axes being at right angles to the anterior elastic lamina, while the long axes of the superficial cells are nearly transverse. The cells between these two are more nearly round in shape. The posterior surface of the cornea has the iris closely adherent to it, and at one part the iris tissue runs continuously into that of the cornea. Microscopical examination of the *choroid* shows the epithelium on its interior to be bulged out in places by detached masses lying between it and the basement membrane. In them, sometimes, no structure can be detected, but in other places the masses can be seen to be made

up of cells somewhat resembling the pigmented epithelium layer, except that they are usually without pigment. Occasionally nuclei can be seen in these cells.

323. *Case of Glioma of Retina.*

Bertie Turner, æt. $2\frac{3}{4}$, under care of Mr. Streatfeild. The patient on March 14, 1873, the date of the excision, appeared in good health, but had two or three moveable slightly enlarged glands under the left angle of the lower jaw, none being noticeable on the right side. *History, &c.*—The mother first noticed, one year and-a-half ago, a “shine” from the interior of the eye, just after the child had had a bad attack of modified small-pox. She says that it was then red, and that it began to enlarge from that time. Lately he has lost flesh somewhat, and the pain has kept him awake much at night. A female third cousin of the patient died as a young woman of a “tumour in the womb.” She “bled to death.” No other history of tumour or cancer is known on either side, but the mother does not know all her husband's relatives. *At the time of excision* the pupil was round and wide. There was slight ciliary congestion. A whitish-yellow reflex was visible, which, on closer examination, was seen to be due to a convex mass, over the surface of which one or two considerable vessels ran; it appeared to shake freely when the eye was moved. The rest of the fundus was obscured by uniform dense whitish haze of vitreous. The lens was clear.

Microscopical Examination.—The *sclerotic* is healthy. The *choroid* also shows no trace of cellular infiltration, though the cells of the tumour lie in places immediately in contact with the pigmented cells of the epithelial layer lining its surface. The *optic nerve* through the entire extent of its section is infiltrated with cells. From the optic disc projects a mass, into which runs from the nerve a large blood-vessel. The entire tumour-mass presents sections of blood-vessels of all sizes. The cells are, on the average, rather larger than white blood-corpuscles. They are round, faintly granular and indistinctly nucleated. No intercellular structure is discernible, except in the neighbourhood of the optic disc, where some fine fibres are found appa-

rently projecting from the disc into the tumour. At one or two places, generally near the choroidal epithelium, there is seen running up into the tumour-mass a structureless substance which is unstained by log-wood. No remains of the retina can be detected. No information as to the result of this case could be obtained, owing to the family having gone away.

438. *Case of Tumour of the Choroid.*

J. P., female, æt. 63, married. Right eye excised by Mr. Streatfeild on December 10, 1874.

History, &c.—She can call to mind, though she never noticed it particularly at the time, that when she covered her left eye up two years ago, on account of a slight attack of inflammation in it, things looked dim to the right. She thought no more of this till about November 1, 1874, when a similar slight attack of inflammation of the left eye, with a little aching pain, caused her to cover it with her hand, and then she found that all she could see with the right eye was a little glimmer of the fire-light. Since then she has had no pain in either eye, except perhaps a momentary dart after examination with the ophthalmoscope since her admission here. She has always done a good deal of needlework, especially lately. Her health has been good, except for occasional dyspepsia. Her father died from an accident when he was 75 years old. Her mother died of natural decay when over that age. The patient has now six brothers and sisters alive, and seven have died, four of decline and three in infancy. She has had eight children, of whom four are alive. The youngest was born 23 years ago. The *Notes at the time of excision* were:—Pupil of medium size, immoveable, except with that of the sound eye. There is no pain. T. n. Good p. l. A large yellowish-grey mass, extending from the inner side of the eye half way through the interior, is distinctly visible by daylight. It seems to reach in front as far as the ciliary processes, and towards the outside to slant away from the front of the eye. There are to be seen on its surface vessels which are probably retinal. On the outer side of the growth there is a clear space, but no details of the fundus are visible.

After the excision the media were found to be clear and the retina *in situ*, except where it was bulged by the tumour beneath it.

The mass appeared to spring from the choroid on the inner side of the eye, and extended backwards so as to overhang the optic disc. It filled nearly two-thirds of the vitreous space.

Microscopically.—Sections (half an inch in length) were made of a part of the retina which was free from the tumour, and approaching the neighbourhood of the ora serrata; they showed it to be raised up at times into folds. The outer layers showed no rods and cones, but a number of fibres extremely well-marked running perpendicularly to the external surface, and having between them bodies like the granules. These granules near the exterior form a thin layer, which is separated by a very narrow intergranular stratum from a second internal much thicker layer of granules; internal to this the perpendicular fibres are scarcely marked, and we have a layer not much thinner than the rest of the retina containing a few nuclei, and also internal to them some indistinct indications of a fibrous structure running parallel with the free surface.

The part of the choroid under the tumour contains very numerous, deeply-pigmented, spindle-shaped cells or fibres. In contact with these lie the cells of the tumour, which are mostly round and unpigmented, with beautiful dot-like nuclei. Cells like these are mostly arranged in groups, each group being surrounded by more deeply-pigmented elongated cells, which, together with a few fibres, map out the tumour into loculi or spaces containing the above-described groups of round cells. The tumour has running through it numerous blood-spaces.

541. *Case of Pigmented Tumour of the Choroid, under care of Mr. Hulke.*

M. H., æt. 36, married, bricklayer. He is a healthy well nourished man; complexion light; eyes blue. He says that he thinks he is wasted now from what he was 14 months ago, when he weighed 14 stones.

History, &c.—Eighteen months ago he remembers to have had slight pain over his left brow, which troubled him so little that he kept on at his work as usual. A year ago while looking

with his left eye at the edge of a pier that he was building to see if it was level, he found that he could only see a little distance down it. He noticed afterwards that he could see better in a downward than in an upward direction, and that when the right eye was shut he had to "cock his head up," in order, with his left eye, to see the things on the table. He has had occasional pain in the eye. Up to five weeks ago it was slight and rare. Since that time it has been worse, and has continued till now. Till a fortnight ago he never made much of an attempt to test the eye as it gave him pain, and then he found on trying that he could not even see shadows. He has felt nothing the matter with the right eye except that it has "flashed" lately, and that it cannot bear the sun. *Family History*.—His father is alive now, æt. 75. His mother died worn out three years ago, when æt. 70. They had five children, of whom the eldest died from accident; he would now have been æt. 42; at his birth the father was 33, and the mother 31 years old. A sister died in a decline. The youngest of the family died also from an accident; at his birth the father was æt. 41, and the mother æt. 39. The present patient was the one next above the youngest, and his mother was 37 years old at his birth. He himself is the father of six children, of whom the eldest is 11 years and the youngest 11 months old. All of these are alive and well.

The eye was excised on June 2, 1875.

Microscopical Examination, &c.—A pigmented tumour was found growing from the lower part of the globe, which it almost entirely occupied. The retina was detached and quite soft, and had no resemblance to its normal structure. The tumour was only connected with the lower one-third of the choroid. Between it and the lens-capsule is a layer of thick membrane containing nuclei but having no other structure. The lens was displaced upwards and backwards from its capsule. On cutting through the tumour its unattached margin was found to be made up of a white layer, and running from the centre of the attached part obliquely forwards to join this white rim was a similar white line. Where the two meet the white material is thicker.

On picking to pieces the pigmented part of the tumour, it is found to be made up of cells with scarcely any intercellular material. These cells are round in shape and all nucleated.

The nuclei in some are tolerably distinct, but in others the granules obscure them. The white part of the tumour differs from the other only in its cells containing fewer pigment granules. The whole mass is very vascular, and we meet with places where the vascularity is extreme, and where some parts of the section present a yellowish brown colour, which is made up of an immense quantity of red blood corpuscles, lying among and almost entirely concealing the other elements of the tissue. These extravasations correspond to reddish brown hæmorrhagic spots that are visible to the naked eye.

547. *Case of Tumour of the Choroid.*

E. M., æt. 57, a married female, under care of Mr. Streatfeild.

Her hair has been of a light colour, but now she is bald. Her eyes are grey.

Her mother was married twice, and there was a family of five children by each marriage. She appears to have been older than her husband. The patient was the youngest but one of the last family. The youngest seems to have died of phthisis. Two more are dead, but she does not know from what cause. There is no history known of any tumour in either family. The patient was married when æt. 24. Her age is now 57, and that of her husband 70. She has had two children, both of whom are now alive, the youngest being 19 and the eldest 22 years of age. Since her marriage she has done no other work than house-work. Her general health has always been good.

Twelve months ago she noticed black spots floating before her right eye, and then rings and stars of light during the day, but more particularly at night, when her eyes were shut. She never observed any coloured rings round a light. Eight months ago she came here. The eye was much the same except that the sight had become dim. It still continued to get more dim, and lately she has not been able to distinguish light from darkness. She had no pain till June 9th, five days before the date of excision. On October 5, 1874, when she was first seen here, the retina was detached and the lens was cataractous.

At the time of excision the tension of the globe was much increased. On opening the globe the retina was found quite

detached, except from the optic disc behind, and from its attachment to the back of the lens capsule in front, to the posterior surface of which it was folded in from the ora serrata. The eye was very hard. A yellowish fluid escaped when the sclerotic was cut. A small tumour, the size of a haricot bean, was found at the upper part of the interior of the globe.

Microscopical Examination.—The *choroid* near the tumour does not deviate materially from the normal condition. Its epithelial layer runs unchanged over the thickening of the choroid which constitutes the tumour. The *tumour* appears to be due to the very abrupt transition of the normal choroid into a great mass of cells, with large vascular interspaces, round which the cells appear to have somewhat of a radiate arrangement. Many of the cells contain pigment granules, but these vary in number and intensity of colour very much in different places, for in some sections almost the whole is pigmented, while in others comparatively few cells contain pigment. It appears as if the pigmented cells were more numerous where the vascular spaces are larger and more frequent. In some parts these spaces are in area almost equal to the solid part of the tumour. They are irregular in shape and impart to it quite a cavernous appearance. The individual cells are round or oval in shape, and have no intercellular matter, or if there be any it has only the appearance of a little granular *débris*. Surrounding many of the vascular spaces are seen a few large highly pigmented cells of somewhat irregular shape; elsewhere, however, the pigmented and unpigmented cells are arranged in masses, which thus have the appearance, except at their edges, where they run into the surrounding cells of the tumour, either of being uniformly moderately pigmented or almost entirely free from pigment.

This patient was heard from on July 24, 1875. She then was reported as being free from any symptoms of its return.

474. *Case of a large Tumour removed from the cavity of the Orbit.*

F. R., æt. 32, single, cook, under care of Mr. Couper. A stout, florid, coarse-looking woman.

She lives well, and is allowed $1\frac{1}{2}$ pints of beer daily. She says that she suffers from a sluggish liver, and that at times she

has no appetite. Her father, æt. 63, and her mother, æt. 62, are alive and healthy. There has been a family of nine children, of whom only one is dead, and this from typhoid. There is no history of any severe illness of any sort, or of any tumour or cancer in any member of the family.

In February, 1874, she first noticed the right eye becoming enlarged. There was also much pain over that side of the head. On September 29, 1874, she came here as out-patient, when the diagnosis was: *Right eye*, Proptosis and a somewhat swollen optic disc. Optic neuritis was also noted, together with an obstruction to the outflow from the retinal veins; reads J. 16 barely. Movements of eyeball perfect. *Left*, V. = $\frac{2}{20}$ barely. Since then the proptosis has gradually increased, and now (Feb. 6, 1875) the eye can easily be dislocated from the orbit, and a firm mass can be obscurely felt behind the eyeball. On the same day the eye was excised, and a fleshy-looking, well-defined, somewhat lobulated mass was removed from the apex of the orbit. It was situated on the outer side of the optic nerve, which was not involved in the tumour, though it was flattened by the pressure. The tumour was enucleated entire. Its measurements were:—Antero-posterior diameter = 9 lines; longest transverse = 6 lines; vertical diameter = 8 lines.

Microscopical Examination.—Sections made after it has been hardened in alcohol show a fibrous stroma, which resists teasing, and, after much trouble, only separates into small lumps. It contains a great many small nuclei, of which some are round, while others are oval or more elongated in shape. In many of the nuclei, especially the round ones, one or two dot-like nucleoli can be detected.

In July, 1875, she was seen by Mr. Couper, and there were no indications whatever of the return of the tumour.

499. *Case in which a small Tumour removed from under the Conjunctiva presented, microscopically, a bony structure.*

Annie Langdill, æt. 14, under care of Mr. Bowman.

On March 9, 1875, a small hard moveable growth, about the size of a pea, was removed from under the ocular conjunctiva of the right eye, near the outer canthus. It is reported by the

mother to have been noticed almost directly after the birth of the child, and to have been the same size as now when first seen.

A fragment of it, when treated with a drop of strong nitric acid and examined under low powers of the microscope, is seen to effervesce strongly. Then the tumour was put into half per cent. chromic acid solution, and a section was made on 18th March, 1875. It is seen to be made up of Haversian systems which are neither very complete nor very regularly disposed. The lacunæ are angular. The canaliculi cannot often be traced to unite with those of neighbouring lacunæ.

443. *Growth from Sclero-corneal Junction, occurring in a private patient of Mr. Lawson, æt. about 70, on account of which the Eyeball was excised.*

Half of the specimen, showing the relation of the tumour to the sclero-corneal junction, is preserved and mounted. A drawing was made by Mr. Burgess, showing two aspects of the preserved half. *Description, &c.*—A growth, about the size of a bean, whose surface is slightly fissured into irregular lobules, springs, by a rather constricted neck, from the sclero-corneal junction on the outer side of the pupil, which it partly overhangs. The eye in other respects appears healthy. A similar growth has been previously removed from the same spot. The patient died, from other causes, six months after the operation, and then no return of the tumour was reported.

A microscopical examination of the attached part of the tumour shows that some of the superficial bundles of fibrous tissue, passing from the sclerotic into the cornea, separate a little from each other, and contain, in their interstices, cells which are generally of round or oval shape, and rather large size, and contain a nucleus and one or two dot-like nucleoli, besides some faintly granular matter. More superficially, the bands are arranged more loosely, and by their union and interlacement, often form irregularly shaped loculi, containing cells similar to those already described, but generally a little larger. These cells, moreover, are nearly always unpigmented, whereas, in the deeper layers of the tumour, many of the cells contain pigment. Deeply also are seen the cut orifices of many large blood-vessels.

(This specimen was exhibited by Mr. Lawson at the Pathological Society, and will, therefore, be found mentioned in the "Transactions" of that Society for 1874-75.)

544. *Case of Tumour filling the cavity of the Globe and forming a large mass outside the Sclerotic—Death from hæmorrhage a few days after operation.*

Samuel C., æt., 43, plasterer, under care of Mr. Wordsworth.

History, &c.—He is a fair complexioned, well nourished man, rather under the medium height. Has been married eighteen years, but has had no family. He is the eldest of fourteen children. His mother died apparently of heart disease, in 1861, at the age of 47, having been about seventeen years old at the time of his birth. His father was æt. 24 at marriage, and died of phthisis in 1868. Of the fourteen children of this union, six died in infancy, one, an imbecile, died æt. about 20, and two others of phthisis about the same age.

The patient had good health up to August, 1871, when he first noticed a smokiness before the right eye. The sight gradually failed, and in about six weeks was entirely gone, but without any other symptom. On November 25 he caught a bad cold and was laid up four months in consequence of the cold having flown to the eye, which was then painful and red but not enlarged. After the cold got well, the eye remained blind, but without other symptoms, up to last Christmas, when it began to swell and be painful, and it soon assumed its present condition. About a fortnight after Ash-Wednesday he had an attack of severe pain in it, lasting several weeks.

On examination, on June 1st, the eyeball was bulged forwards. Its apex, corresponding in position with the cornea, was covered with a dry yellowish-brown scab, surrounding which was the tumid congested conjunctiva. The palpebral fissure was 2 inches long and $1\frac{1}{2}$ inches wide. The tumour, which could be felt beyond the globe, was firm, somewhat elastic, and appeared pretty free from the surrounding tissues. No enlargement of neighbouring glands could be detected.

On June 5th the tumour was removed, after division of the outer canthus. It completely filled the orbit, and was attached

far back and closely at the apex of the cavity, so that it could not be separated cleanly there. There was very little bleeding. Next day violent hæmorrhage occurred on removing the plugs of lint in order to apply chloride of zinc. After that it bled on several days, and the man died, apparently from exhaustion, a few days after the operation.

On a horizontal section of the mass, the globe is found to be directly underneath the brown scab described earlier as representing the cornea. The eye-ball is somewhat shrunken and completely filled with a moderately pigmented softish tumour mass, the pigmentation being more decided towards its centre. The *sclerotic* is continuous all round the globe, the tumour appearing to have traversed it without making any obvious hole, though it is thinner on one side than the other. The *optic nerve* extends in the excised mass about $1\frac{1}{2}$ inches backwards from the optic disc. It has all round, and, in fact, almost continuous with it, the posterior part of the tumour mass.

That part of the tumour lying on one side of the horizontally cut mass is tolerably firm and lighter in colour, apparently possessing no pigment. That on the other side is softer and a little darker, though even here the pigment is very scanty.

The measurements of the mass are: extreme transverse diameter, 20 lines. Broadest diameter included transversely in the Sclerotic, $7\frac{1}{2}$ lines. Long diameter of entire mass, about 24 lines. Long diameter of remains of globe, $8\frac{1}{2}$ lines.

Microscopically :—The contents of the sclerotic when teased out, yielded well marked caudate cells, which contain a little granular pigment and generally one nucleus, though sometimes two are seen. The central layers of the *sclerotic* remain unaltered, and in no specimen that has been examined can cells be seen perforating its whole thickness, though on both its outer and inner surfaces, especially the latter, its superficial fibres are raised up by masses of cells which lie beneath and between them. As this is more marked on the inner side of the sclerotic, it seems likely that the tumour extended outwards from the interior of the globe. The cells outside the sclerotic are round, nucleated, and scarcely ever contain even a trace of pigment.

450. *Case of partially Pigmented Sarcoma of the Choroid with detachment of the Retina—History of a previous Black Tumour near the Eye.*

History, &c.—Fanny Youens, æt. 61, married, has had nine children, of whom five are now alive; the youngest was born 21 years ago. Of the remaining four, one was still-born and three died, each about three years old, of “water on the brain.” These had convulsions, but their heads were not noticeably large. The patient is a large made woman; hair slightly grey. Her father committed suicide. Her mother died from an accident. One brother is now alive. Three have died, two of consumption, and one of dropsy. One sister only has died, and this in childbirth. The remaining four are alive and well. There is no history of tumours, &c., in the family, except that fifteen years ago she had a “black” lump cut out from the inner angle of the left eye by Mr. Critchett. It was a year or two in coming and appears from her description to have been just inside the inner canthus. She heard it called a tumour here, but I can find no record of it in the Hospital books. She was operated on as an out-patient.

Three years ago she found that the sight of the left eye was more dim than usual. The dimness increased for a year and then she came here. The diagnosis, &c., on her out-patient paper, says:—“*Left eye* has been nearly blind for twelve months, but lately has become much worse. There is now a very large detachment of the retina of nearly the whole lower half. *Ophthalmoscopically* are seen on its surface some black patches—other parts are glistening white—others give the usual greyish reflex. R. Hyp. $\frac{1}{10}$, has been wearing + 8 with which V. = $\frac{2}{20}$.”

At the end of about another year, *i.e.*, towards the end of 1874, she could not distinguish light from darkness. She had no pain whatever till about January 1st, 1875. On January 14 she came here again, and her paper says “Glaucomatous condition of the eye after detachment of the retina [? tumour].”

The eye was excised by Mr. Lawson on January 15, 1875.

After the excision, the retina was found to be completely detached, except from optic disk behind and from ora serrata in front, but it is folded inwards so abruptly from its attachment

to the ora serrata, as to lie pretty close to the back of the lens capsule, from which it is only separated by the much shrunken remains of the vitreous lying there. When the fold of the retina has nearly reached the centre of the lens capsule so as to have the appearance of springing from there, it proceeds backwards as a tube containing the rest of the vitreous to its attachment to the optic disc.

A tumour, about the size of a small bean, is found outside the detached retina, springing from the choroid by a peduncle, the attachment of which extends from close to the disk outwards to the equatorial line. The body of the tumour supported by this peduncle reaches nearly to the back of the lens capsule. There is but very little constriction between the peduncle and the body of the tumour.

Transverse microscopical sections through the optic disk show that the tumour begins but a very little way from the disk as a thickening of the choroid, and that the epithelium of the choroid rises so as to lie over the surface of the tumour, and is here folded in occasionally so as to fit into depressions. Towards the free surface, the growth is made up of cells, which for the most part appear to be circular, possibly from their being transverse sections of elongated cells; while others are oval. They have large nuclei, and in some are seen again dot-like nucleoli. Most of the cells are unpigmented, a few only contain a small number of pigment granules. Nearer to the sclerotic, however, the pigment is more abundantly distributed, so as to resemble the cells of the pigment layer (*lamina fusca*) lining the normal choroid. In places numerous pigmented cells are arranged so as to form indistinct wedges running among the unpigmented cells of the tumour.

On July 24, 1875, this patient was reported to have no return of the tumour. Her health was good. There was still a discharge from the wound.

447.—*Case of Glioma of the Retina of the Left Eye.*

Sarah Leach, æt. 2, under care of Mr. Hutchinson. History taken January 16, 1875. The patient's mother is thirty-six years old. She has been married eleven years, and has had

three children, of whom the eldest is five years old, and the patient is the youngest. All three are now alive. She is a delicate-looking woman, eyes blue; complexion fair. She miscarried four years ago. The father is a labourer, æt. 41; health good; hair, eyes, and complexion, dark. There is no consumption known on his side of the family. His aunt is reported to have died of a tumour in the breast. The mother's mother, æt. 58, is now alive and well; she was married when under twenty years old; she had a sister who died of consumption. The mother's father died from an accident. He was over twenty years old when he was married. One of his brothers died in consumption. There is no history of any glandular disease in either family.

The mother noticed in Whitsuntide, 1874, that the eye under examination was of a darker colour than the other. Soon after that the child had the measles. Two months ago she fell with the brow of this eye against a scraper, then the white became bloodshot, though there was no blackness round the eye. She had no pain till a month ago; then she did not make much complaint, but simply held her hand over the eye, and said it was not well.

On December 2nd, 1874, the lens was opaque and yellow. The aqueous was bright yellow, and the pupil dilated to a mere rim. On January 15th, 1875, the left eye was somewhat enlarged, the lens as before, and the pupil so dilated that no iris was visible. The cornea was perhaps enlarged a little in circumference, and the lens shrunken, so that the fundus could be seen through a wide zone all round the equator of the lens. Reflex a bright yellow.

The eye was excised January 15, 1875. An equatorial section showed the tumour to be pale yellow in colour, and of very soft consistence. It filled up the whole of the cavity of the vitreous, except a small part above and in front. It was traversed by ramifying blood-vessels. A part, which was of a more full yellow colour than the remainder, lying on the outer side, appeared to be separated from the rest by a thin dark line which was found on microscopical examination to be the epithelium of the choroid. This visible separation of the choroidal epithelium from the sclerotic appears in this equatorial section to extend over about one-third of the circumference of the globe. The

optic nerve, except just where it enters the globe, is swelled to twice its usual size, and on transverse section its contents are seen to bulge out beyond the level of the cut: longitudinal stained sections show the nerve sheath to contain many more nuclei than usual, while internally no nerve fibres can be seen, their place being taken by a mass of stained nucleated cells mixed with which there is abundance of fibrous tissue. The same structure is shown in transverse sections. Sections through the *tumour* and *optic disc* show the cells which existed in the optic nerve to protrude as a solid funnel-shaped mass from its apex at the disc into the cavity of the globe. Into this mass blood-vessels run continuously from the optic nerve. On either side of this mass is seen a gap, the outer boundary of which is formed by a layer of pigmented epithelial cells, and under this a mass of cells similar to those in the optic nerve and in the funnel-shaped mass, through which are scattered rare branching pigment cells. This thick layer represents the *choroid*. External to this the *sclerotic* contains many blood-vessels, some cut across and filled with blood-corpuscles, and others perforating the sclerotic, and running directly into the tumour. The number of nuclei found usually in the sclerotic is increased, but no cells can be detected here.

From the anterior surface of the tumour there can be removed (after hardening) several fragments of tough membrane and coarse and reticulated fibres, representing the *vitreous*. These, when examined microscopically, are seen to have an indistinctly fibrous structure, and to have clinging to them many stained cells like those of the tumour, and also still more numerous unstained cells arranged principally in clusters, which are probably red-blood corpuscles.

The pigment layer of the *ciliary processes* appears to be intact, but the *ciliary muscle* has its place occupied almost entirely by stained tumour-cells. Close inside the ciliary processes are seen similar cells loosely distributed.

The child is reported as having run about nicely after the operation, and as having had no return till about March 15, 1875. On March 31, a woman called and said that there was projecting from the inner corner of the orbit a lump the size of an orange. On April 5, the child came, and the tumour was found to be as above described, but the cloth was not removed as

there had been severe bleeding from it. She was weak, wasted, and had a bad cough. She died in the country on April 30, 1875, three months and a half after the operation. No examination of the body was made.

456. *Case of Glioma of Retina nearly filling up the cavity of the globe.*

Julia Hester, æt. 22 months, under care of Mr. Streatfeild.

Family History, &c.—The father, a barrister's clerk, is said to be consumptive. He has had hæmoptysis twice, each time bringing up about a pint of blood. He and a sister survive out of a family of four, of whom one died phthisical and the other of acute rheumatism.

The mother is one of a family of seven, of whom five died young. She suckled this child till it was fourteen months old, but began to feed it at three months. The marriage took place eight years ago, but this is the only child.

The patient is fairly well nourished, complexion fair, hair light brown, cheeks red, irides blue. There is no history of any pain in or near the eye. The mother first noticed something wrong ten months ago, when she thought the child had a cast in the eye. She took her first to Gray's Inn Road Hospital six weeks ago.

Before excision, a yellow reflex was clearly visible not far behind the lens. The surface of the tumour appeared to have on it red vessels. Eyeball excised January 21st, 1875.

The tumour is found to nearly fill up the cavity of the globe, except a little space in front and above. It is yellowish in colour, soft and pulpy in consistence. To the naked eye the optic nerve does not appear to be involved. The *choroid* appears to be entire and distinct from the other tunics through its whole extent. *Microscopically*, the choroidal epithelium is seen to form an unbroken layer, and the stroma is tolerably normal in appearance, though but very slightly pigmented. The sections of cut vessels are very large and numerous. No cells resembling characteristic glioma-cells can be detected in the choroid, nor is there in it any appearance of an abnormal aggregation or multiplication of cells of any sort. Sections of the *optic disc* show a

mass of glioma-cells protruding from it into the cavity normally occupied by the vitreous. This mass is rather funnel-shaped, being narrow where it springs from the disc, and rapidly widening after it leaves it. For a short distance on one side of the disc the retina and choroid are wanting in all the sections, and on the other they are *in situ*. In the latter part the *choroid* is healthy. With regard to the *retina*; the Membrana Jacobi is quite normal. The outer layer of granules in the same part of the eye is normal, and begins a little way from the optic disc, as a thin layer. The inner granular layer is in places diffused a little, so as to extend almost to the outer granular layer in one direction, and to the nerve-cell layer in the other, but there seems to be really no multiplication of the granules here, only they are less closely distributed. The granules, at their commencement close to the disc, merge gradually into the glioma cell-mass which projects from the disc, there being no apparent distinction between the granules and the glioma-cells, as to structure. It is interesting to note that, though the two seem here to be continuous, yet that the part where they pass from one into the other, though consisting of cells resembling them both, is not so dense or so highly-stained as is either the granular layer or the glioma mass.

Except in the neighbourhood of the optic disc, the *tumour* separates readily from the choroid, leaving it *in situ*. It is friable and soft, even after long immersion in alcohol, but its outer part is a little more consistent than the rest, and gives the impression of an indistinct membrane. *Microscopically*, sections cut at right angles to the plane of the normal retinal surface show an outer layer unstained by logwood, which, over the greater part of its extent, cannot be made out to have any precise structure, but which exhibits, in one or two spots, distinct rods, and thus declares itself to be the Membrana Jacobi. Internal to this is a layer deeply stained by the logwood, made up of cells arranged generally in rows, which run inward. Inside this is a layer of cells more lightly stained, and within this again are the cells of the general tumour-mass, which stain less deeply than those of the layer just inside the Membrana Jacobi, but more deeply than those cells just described as separating these from the tumour. It would appear, therefore, as if here the deviation from the normal condition of things

might have occurred in the internal granular layer, by reason of the great multiplication of its granules. The cells of the tumour are seen to be mostly round in shape, though some are angular, and others are drawn out a little at one end. They vary considerably in size. Nearly all can be made out to have a dot-like nucleus, and in some of the larger cells two, and even three, can be seen. There appears to be extremely little intercellular matter, but occasionally a few fine fibres can be detected.

It cannot be seen where the implicated retina passes into that part near the optic disc which has been described as being nearly healthy.

Proceeding backwards from the optic disc, the first part of the optic nerve is infiltrated with stained bodies, resembling glioma-cells. Further back the stained bodies are smaller and fewer, and resemble in appearance the nuclei seen in stained sections of the healthy optic nerve.

July 22, 1875. The patient is reported as having had no return of the tumour, and her general health is said to be good.

426. *Case in which an Eye, which had been quite blind for many years, was found on excision to be filled with a growth of doubtful character, and the choroid converted into a dense fibrous layer.*

Henry Battram, æt. 55, woodman, admitted under care of Mr. Hutchinson, November 2, 1874.

History, &c.—On looking through a telescope ten years before admission the patient found, to his surprise, that the field of vision of the right eye presented nothing but a green colour. The perception of light gradually faded, till, at the end of two years, it was totally gone. He had no medical advice about it. Soon after this, there came on gradually a shooting pain in the same eye lasting for a few hours at a time, and more especially occurring in the evening. This continued almost daily for a fortnight. For the next six months he was free from pain, but, at the end of this time, he had a second attack which lasted for a month; and then after another interval of a year's duration a third attack came on and lasted six weeks.

He has since been the subject of similar occasional fits of

pain, but they have been gradually getting more lengthy and more severe. He is now suffering from one which began four months ago. During the attacks there is slight sympathetic affection of the left eye, and, in the intervals between the acute pain, there remains in the right eye a slight pricking sensation.

The left eye has always been healthy and has never been the subject of any blow or other accident.

He drinks beer rather freely, but does not smoke. There is no history of syphilis, or any severe illness, except variola 28 years ago. He is a large healthy florid looking man.

The eye was, after excision, divided into upper and lower halves. The lower half was drawn by Mr. Burgess. The globe was found to be somewhat shrunken, and to be rather elongated transversely.

The *vitreous* was absent, being apparently replaced by a solid growth, which was of a pale yellow colour behind, while in front it was a little browner. It was not very friable. On removing this very gradually, by gently brushing it with a camel's hair pencil, it was found not to spring from any special part of the tissues external to it, but to be generally pretty uniformly connected with them. The *sclerotic* is thickened in places and a little puckered. Immediately within it is a layer of pigment, then a bluish-white tough layer thickened into nodules in places, and apparently fibrous or cartilaginous in structure. It is extremely hard in places. Next, internally to this, the tumour, or mass, already mentioned begins, the precise line of demarcation not being very clear. The *cornea* is much thickened and opaque. The *lens-capsule* is whitish and opaque; and the *lens* is of the colour and consistence of glue.

Microscopically the growth is found to consist entirely of very small cells, some of which are drawn out into slender prolongations at both ends, while more are drawn out at one end only. All are nucleated. The bluish-white layer, external to the tumour, is found to consist apparently of white fibrous tissue very tough and difficult to tease out, and enclosing at places a few nucleated cells; this layer is in many places as thick as the sclerotic, while, at other points, it is barely recognizable; it appears to have no special connection with the optic disc, and extends over the back of the lens capsule as a thin layer. A

little brown pigment forms a thin much interrupted layer near the internal surface of the bluish-white fibrous layer described above, and the outer part of the morbid growth contains here and there a little scattered brownish pigment; this is the remains of the choroidal epithelium. On the exterior of the fibrous layer there is found (as already mentioned) another layer of pigment which is generally well marked, though it is interrupted a little occasionally; it is thickened in the position of the ciliary processes, and it extends into the iris; its cells are more highly pigmented than those above described; its thickness is equal to about a quarter of that of the normal sclerotic; it would appear to represent the deeper layers of the choroid. External to this is a layer of fibres loosely interlaced, and containing, in their interstices, cells which are frequently branched and moderately pigmented; this layer is in many places two-thirds of the thickness of the normal sclerotic, but in other parts it is much thinner; it appears to represent the much thickened lamina fusca. Next, externally, we have the sclerotic and cornea which, in their minute structure, are normal. No ossification has taken place in any part of the dense fibrous layer, which, however, is evidently an extremely altered choroid, and might, therefore, be expected to develop into bone sooner or later. Of the mass filling the globe, it is impossible to say with certainty whether it has been formed from the retina or the vitreous, and whether it should be looked upon as an imperfectly organized tissue, the result of long-continued subacute inflammation, or as a morbid growth in the stricter sense of the word.

PART II.

A Periscope

OF

CONTEMPORARY OPHTHALMIC LITERATURE.

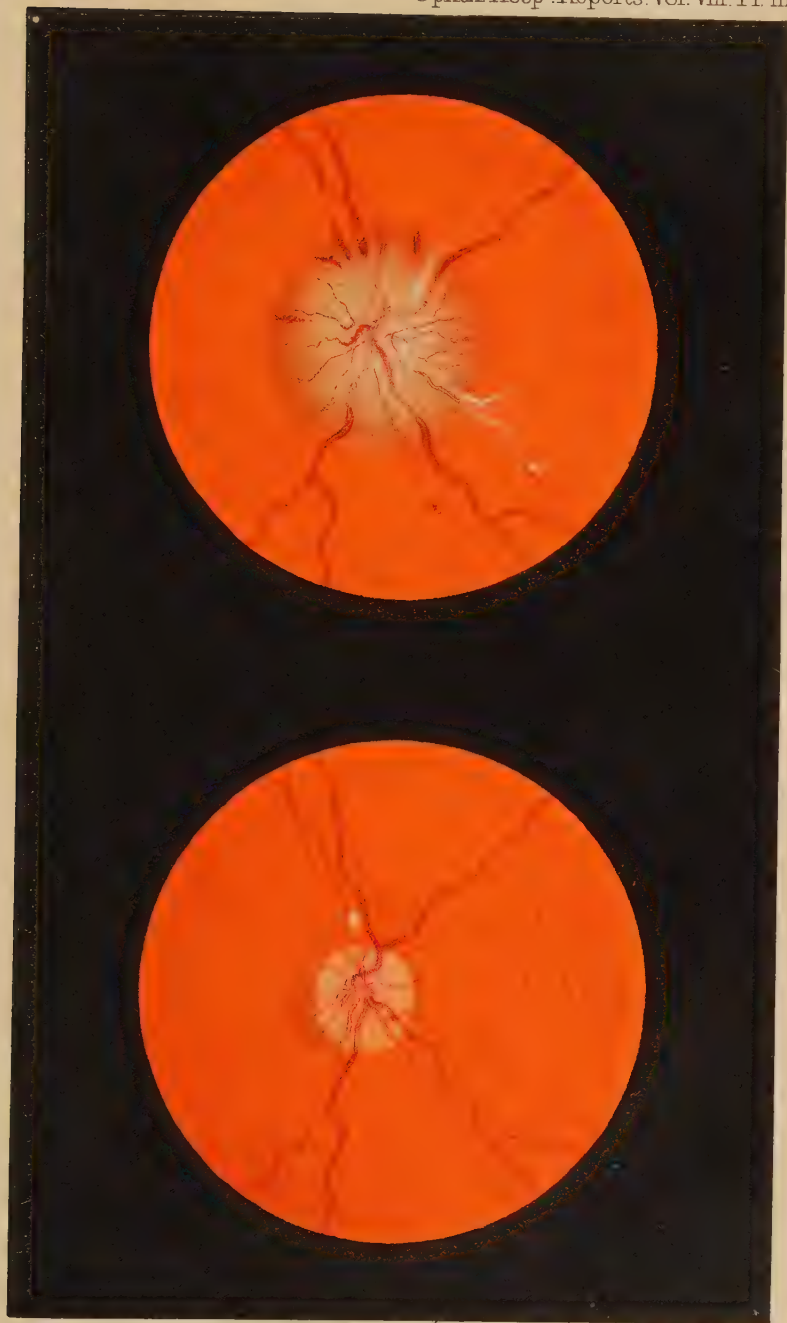
HUGHLINGS JACKSON, ON RECOVERY FROM SEVERE DOUBLE OPTIC NEURITIS, IN A CASE IN WHICH THERE WAS NO DEFECT OF SIGHT.

THIS case, and the chromolithographs by Burgess (see Plate III), have already appeared in Vol. IV of Crichton Browne's West Riding Asylum Reports. By Dr. Browne's permission the illustrations are reproduced. The upper one shows a disc during the acute stage of neuritis, the lower the same disc after recovery.

It is an exceedingly common thing to see neuritis, and neuritis as extreme as that here illustrated, with good vision. Hence, as Dr. Jackson has been urging for many years, the ophthalmoscope should be used by routine in cases of intracranial disease. Ophthalmic surgeons admit that optic neuritis may occur with very good sight; but Dr. Jackson wishes to urge that in physician's practice it does so occur *very often*. Indeed, there is in the cases of optic neuritis which come under his care rarely enough impairment of sight to prevent the patient reading the smallest type.*

But, so far as I know, he says, I have convinced very few persons of the truth of my assertion, that sight is often unaffected in optic neuritis. It seems mere nonsense to some to assert that when there is severe optic neuritis the patient can read *brilliant* type. Hence I continue to insist on the fact whenever a legitimate opportunity presents itself. I assert that we have frequently the *pathological condition*, optic neuritis, without the *symptom*, defect of sight. This is not a mere pathological curiosity. Those who ignore this fact naturally do not in cerebral cases

* What follows is almost a verbatim reprint from Dr. Browne's West Riding Asylum "Reports."



E. Burgess del. et ch. lith

W. West & Co. imp.

Recovery from Optic Neuritis.

look at their patient's optic nerves until sight fails, *and thus they overlook the early and remediable stages of neuritis*. I believe that we should prevent amaurosis frequently if we always discovered the præ-amaurotic stage of optic neuritis and treated the affection energetically.

Those who wait until the patient's sight begins to fail, may err in taking as an early what is really a late stage of optic neuritis. So far as I know there is but one kind of optic neuritis from intracranial tumour (and other adventitious products). The ophthalmoscopical appearances vary extremely according to stage. Making conveniently, although arbitrarily, four stages, sight commonly fails in the third stage—a stage which is, I believe, by some called the “swollen disc.”*

The uppermost drawing shows that in speaking of optic neuritis with good sight one does not mean a mere slight change such as might be vaguely called “congestion.” The more one uses the ophthalmoscope the less confidently one speaks of “congestion,” and “anæmia.” Sight may be quite good when the disc is very much swollen (and so much altered that there is really no true disc discoverable), when the arteries are scarcely traceable in the swollen *ci-devant* disc, when the veins, which are dark and partly concealed, give clear evidence of swelling by knuckling over the edge of the diseased patch: there may be scattered blotches of blood.

Those who do not look at the optic discs unless there be failure of sight will not only overlook the earlier stages of optic neuritis, they may overlook it altogether. For sight may not fail. I have seen not a few cases in which sight did not fail.†

* I may here refer to a lecture on “Optic Neuritis from Intracranial Disease” which I published in the “Medical Times and Gazette,” August 26, 1871. The following extract from that lecture refers to stages:—

“4. *The Stages of Optic Neuritis*.—I now tell you what you see in cases of optic neuritis at different stages. In the sense that there are abrupt differences, there are no stages; there are gradual changes from the beginning of the process through its ascent to a climax of acute change, and in its descent to the permanent change—atrophy. Nevertheless, although the changes are gradual, the appearances are strikingly different at different times, and most unlike at the two extremes—the height of acute change and permanent atrophy. We will make four stages. You will have gathered from what I have just said that this division into four is arbitrary. I used to make two stages only. It is, I think, convenient to make four, for learners, at all events. The following is an account of what is seen at different stages of a severe case. I use the expression ‘severe’ advisedly, as cases vary so much in degree and progress that I do not pretend to be able to describe ‘typical’ cases. Particularly observe that cases do not always run through these stages. There may be retrocession from either the first or the second stage, and not a progress to atrophy. I speak of what you may see by the indirect method of examination.”

† I have recorded a case showing this strikingly in the “Medical Times and Gazette,” Dec. 7, 1872. A *résumé* of the chief points of it is given in the “Roy. Lond. Ophth. Hosp. Rep.,” vol. vii, part iv, Feb., 1873, p. 518, in section 4, “Recovery from Optic Neuritis.”

In the case I have to relate it did not. A common termination of optic neuritis is atrophy—what I call its fourth stage—but occasionally the swelling of stage 1 or 2 clears up, and, as in the case here illustrated, the disc resumes a normal or nearly a normal appearance. In this case the optic neuritis would never have been inferred; there was nothing whatever in the man's complaints or bearing to lead to a suspicion that his optic discs were abnormal. On the contrary, it would be said by most people that there "could not be" anything the matter with them. Had I not used the ophthalmoscope by routine the case would have been little more than one of paralysis of the third nerve. I should have ignored the *far more important symptom* (or, correctly speaking, pathological condition) optic neuritis.

I purposely give the case briefly, for without an autopsy it is of little value except as showing—

- (1). *That sight may be good when there is extreme neuritis, and*
- (2). *That the neuritis may disappear, the disc resuming what is practically a normal appearance.*

The patient did not recover from amaurosis; he never had any amaurosis to recover from. He took very large doses of iodide of potassium. My opinion is that this treatment prevented amaurosis, but as I always give large doses of iodide of potassium in such cases I cannot show more than a *post hoc*. Whenever I see optic neuritis I always give large doses of iodide of potassium.

A remarkably robust and healthy-looking Swedish seaman, 40 years of age, was admitted into the London Hospital on June 20, 1873. He had had a chancre many years ago, but apparently no secondary symptoms. He had had pains in the right side of his head for nine weeks, and after admission he had a little deafness of the right ear. One day, ten days before admission, he had some vomiting.

There was complete paralysis of the right third nerve which came on the day before admission. There was double optic neuritis. With the left eye he could read the smallest type, and denied that there was anything the matter with that eye; on the right side there was of course the defect of sight producible by palsy of accommodation. The first drawing of the left disc was made by Burgess on June 30. The patient could then as always read No. 1½ Snellen.

He went out apparently quite well on August 19. The palsy of the third nerve had disappeared rapidly under the administration of iodide of potassium; the neuritis had not disappeared. He went to sea.

He came to show himself on October 23. He looked quite well and felt well. The morbid changes in his discs were insignificant. Those on the left side are represented in the second drawing, which was taken by Burgess, October 23. Seen for

the first time, a good ophthalmoscopist would hesitate to say that there had ever been any important acute change in that disc.

Such a case leads one to study carefully minute changes in the discs (as seen by direct examination), in order to make a retrospective diagnosis of optic neuritis.*

It is probable that the case I have related was one of intracranial syphilis. But as there was no autopsy it is not worth while commenting on this aspect of the case. I have reported several cases of optic neuritis from syphilitic disease of the brain, as proved *post-mortem*. ("Medical Times and Gazette," 1872-73-74.) I have recorded a marked case in the July number (1874) of the "Journal of Mental Science." I will now only say that *optic neuritis from syphilitic disease of the brain is not syphilitic optic neuritis*. Optic neuritis does not occur in such cases because syphilitic disease affects the optic nerves directly. There is a syphilitic tumour in the brain, and this causes optic neuritis, not in its character as a *syphilitic* lump, but in its character as a "foreign body." Any sort of mass in either the cerebrum or the cerebellum will cause optic neuritis.

I showed the original of the chromolithograph No. 1 at the meeting of the British Medical Association in August, 1873. The following is cut from the museum catalogue. I extract it to show that I then believed that the neuritis would disappear leaving sight good.

"Ophthalmoscopic drawing by Burgess. The patient, a man, could read the smallest type (No. $1\frac{1}{2}$ Snellen) on the day (June 30, 1873) the drawing was made. His sight is still (July 21st) good. It is believed that the abnormal change will pass away, and that sight will remain good.—*Dr. Hughlings Jackson*."

In looking up this entry I come across the catalogue notes of cases by my colleague, Dr. W. R. Gowers. As Dr. Gowers' opinion on any point in medical ophthalmoscopy is most valuable, I try to strengthen the position I have taken up by his testimony. I italicise those parts which bear on the point I have been urging. The cases Dr. Gowers relates have numerous other important bearings.

The following is cut out of the catalogue. (Drawings 176, 177, 178).

"*Dr. Gowers on Optic Neuritis.*

"1. Optic Neuritis, *with preservation of acuity of vision*. Left optic disc of a woman, æt. 35, suffering from headache, epileptiform convulsions, and paralysis of the right arm, due probably to syphilitic disease of brain. The position of the optic disc is

* On this matter I have written in the "Medical Times and Gazette," Nov. 10, 1872; a reproduction of those remarks will be found in the "Roy. Lond. Ophth. Hosp. Rep.," vol. vii, part iv, Feb., 1873, in section 5, p. 520, "Slight Changes in the Optic Discs in cases of Cerebral Disease."

occupied by a greyish-red swelling, the redness being punctiform in the centre, striated on the peripheral portion. Vessels of nearly normal calibre, tortuous, and partly concealed on the swelling. The eye could read No. 1 Jäger. Field of vision of normal extent; blind spot of about three times the normal size. Both discs similar. *The neuritis cleared completely under anti-syphilitic treatment, leaving no atrophy.*

"2. Slight optic neuritis, from a girl, æt. 15, suffering from epileptiform convulsions. Outlines of disc lost under a reddish swelling of moderate prominence, and of about twice the normal diameter of the disc. Redness punctiform in the centre. Vessels of normal size. Connective tissue about the vessels in the centre of the disc unduly conspicuous. *Could read the smallest test-type.*

"3. Early stage of neuritis. Left optic disc of a girl, æt. 25, suffering from right-sided convulsions, right hemiplegia and aphasia, due to a gliomatous tumour of the left hemisphere. A reddish swelling occupied the position of the disc, and concealed its outlines; the outer part was paler than the centre, and striated. Veins distended; arteries of normal size, partly concealed by the swelling. *The eye could read No. 1 Jäger. Both discs were similar.*"

Here Dr. Gowers gives the further course of the case. The girl became blind.

EYE-SYMPTOMS IN PATIENTS THE SUBJECTS OF CONGENITAL SYPHILIS AND WITH DISEASE OF THE NERVOUS SYSTEM.

In the "Journal of Mental Science," January, 1875, Dr. Hughlings Jackson relates a case of dementia occurring in a lad who had choroiditis of one side. The boy died but no autopsy was obtained. The mental condition need not be detailed; only so much is reproduced as bears on the value of the ophthalmoscope in diagnosis.

The following notes of the case were taken in the summer of 1872 :—

"Samuel L., æt. 15, is the subject of congenital syphilis. The evidence supplied by his own person is (1) that he has that malformation of the upper central incisor teeth which has been described by Mr. Hutchinson as characteristic of congenital syphilis. The lad's upper central incisors are small, and narrowed at their cutting edges; they are not notched. (2) There are in the left eye remains of choroiditis; there are numerous pigmented patches. The left optic disc is atrophic (greyish). The cornea is clear."

Dr. Hughlings Jackson makes the following remarks on the one-sided choroiditis :—

"The striking thing was that in the right eye there was nothing abnormal, although the left was much diseased. Both

Mr. Hutchinson and Mr. Waren Tay agree in this. Obviously this non-symmetry in a disease so very 'constitutional' as syphilis is of marked interest to students of disease of the nervous system. The choroid is the pia mater of the eye.

"At first glance the one-sidedness of the morbid condition appears to go against the diagnosis of congenital syphilis. Mr. Hutchinson, however, considers it to be the rule for choroiditis in connection with tertiary syphilis to be unsymmetrical, and this remark applies alike to that resulting from inherited and to that from acquired disease. It is not, however, he tells me, usual to find, as in this boy's case, that one eye is *quite* free from changes. He has, however, seen a few similar cases. The common condition is for one eye to be severely affected and the other only slightly. And he thinks that in some cases of choroido-retinitis in connection with hereditary syphilis, in which the changes simulate those of retinitis pigmentosa, the non-symmetry is a valuable point in diagnosis. Mr. Swanzy, of Dublin, has published an interesting example of this in the 'Dublin Quarterly Journal,' May, 1871. Mr. Swanzy there quotes a letter from Mr. Hutchinson."

The following are further facts in this case warranting the diagnosis of congenital syphilis and thus confirming the diagnosis of the syphilitic nature of the choroidal disease.

"*Family History.*—Two years before his marriage the father had a skin disease, and had a bad sore throat. He is dead; hence the vague history. Moreover, he died insane in Colney Hatch. The boy's mother, six or seven months after marriage, lost 'all her hair' (no doubt an exaggerated expression); soon after marriage she suffered from a severe sore throat, which lasted seven or eight months; her tongue was very sore; she had a skin disease 'like small boils or pimples.'

"The mother had seven children born alive. The following gives the results of all her pregnancies:—(1) Still-born. (2) Died at age of one month. (3) Samuel L., the subject of this report. (4) A child who now suffers from a skin disease. (5) Miscarriage. (6) Died at the age of five months; suffered from 'snuffles,' and had a skin disease. (7) A miscarriage. (8) A child who has a skin disease. (9) Died at the age of six-and-a-half months; 'used to break out in the head,' and suffered from snuffles. Nearly all the children, including our patient, suffered from a rash on the buttocks when infants.

"It is important to note that our patient is the eldest living. This boy has not had keratitis. He may yet have it. There is in my mind no doubt that this lad was the subject of congenital syphilis. The dental malformation, to say nothing of the choroiditis and of the family history, is, I think, decisive. A good many years ago I had the inestimable advantage of working with Mr. Hutchinson, and as a result of seeing many cases with

him I was convinced that he was right in his assertion as to the diagnostic value of the malformation of the teeth he describes. So far as it goes, the family history supports the diagnosis founded on the dental malformation and the choroiditis.

"Of course it is not said that congenital syphilis does not exist without either the dental malformation or the interstitial keratitis. On the contrary, it has been stated that these signs usually exist only in the eldest living of a syphilitic offspring. The younger children, no doubt, suffer in slighter degrees.

"We are justified in concluding that this boy's right choroid had at one time suffered from syphilis, and thus the *hypothesis* was, for the sake of treatment, warrantable that his pia mater, the 'brain's choroid,' had suffered similarly,—had been the seat of a 'pia matritis,' analogous to the choroiditis. My speculation is that there was local syphilitic disease, followed by general atrophy of the hemispheres. It is well known that extensive *local* damage (clot, softening, or tumour) in a hemisphere leads slowly to general wasting of that hemisphere."

In the July No. (1875) of the "Journal of Mental Science," Dr. Hughlings Jackson, in dealing with Syphilitic affections of the Nervous System, mentions several facts of ophthalmological interest. The first of the following extracts is partly to the same effect as the note of Dr. Hughlings Jackson's remarks in our last Periscope, p. 89.

SYPHILITIC AMAUROSIS.

"*Sight*.—Amaurosis occurring with other symptoms attributable to syphilitic disease of the brain may be put down, as a matter of course, to syphilitic changes in the deep tissues of the eyes, choroido-retinitis, by those who do not use the ophthalmoscope. This is a very grave error. It is true that amaurosis, in such cases, *may be* due to syphilitic changes localised in the *fundus oculi*, but as a mere matter of fact, it scarcely ever is. It is nearly always owing to optic neuritis or to atrophy, the sequel of that neuritis. Now, 'optic neuritis from syphilis' is not 'syphilitic optic neuritis.' The optic neuritis produced by a syphilitic tumour is just like that produced by a glioma, or by any other adventitious product in the cerebrum or cerebellum.

"I know of no evidence to prove that optic neuritis is produced either by syphilitic disease actually involving the optic nerve trunks inside the cranium or by syphilitic meningitis at the base.* I speak of post-mortem evidence; clinical evidence is not sufficient.

"I never saw a neuroma of the optic nerve. I do not remember seeing simple atrophy of the optic nerve (atrophy not the sequel of neuritis) in a patient who had other nervous symp-

* "I know nothing of syphilitic meningitis. Need I say that I except cases of meningitis from *bone* disease, the result of syphilis."

toms inferentially due to syphilis, to say nothing of never seeing post-mortem evidence of intracranial syphilis in such a case. The other kind of optic atrophy* is often seen.

"Here it is important to remark that amaurosis from syphilitic choroido-retinitis is really a syphilitic disease of the nervous system, quite as much so as a syphilitic neuroma is. There is syphilitic disease of connective tissue of a nervous organ, the nervous elements suffering secondarily. He who speaks of amaurosis from optic neuritis due to syphilitic gumma in the cerebrum, and amaurosis owing to syphilitic choroido-retinitis, as if they were alike, calling them 'Syphilitic Amaurosis,' without qualification, is not speaking scientifically. It would be like speaking of a whale and a salmon as being zoologically alike."

The following is from the same paper:—

"PARALYSIS OF OCULAR MOTOR NERVES AND VERTIGO.

"PARALYSIS of an ocular motor nerve is a cause of vertigo. Now, the vertigo may be the symptom which the patient has first of all; that is, he has vertigo before there is actual double vision, or obvious strabismus. It would be a great blunder to say of such a case in a patient the subject of syphilis, 'In this case the vertigo was the first symptom of the syphilitic disease of the brain, and then palsy of the sixth or third nerves occurred.' In reality the vertigo would, in all probability, be owing to paresis of an ocular muscle, before actual demonstrable palsy of it occurred. The vertigo continues, of course, when the palsy is established.

"Anyway it would be very misleading to call vertigo, so caused in a syphilitic patient, 'syphilitic vertigo,' for all syphilis does, in such a case, is to damage a nerve bundle, and vertigo would attend paralysis of an ocular motor nerve, however caused. It is an error easy to fall into. If the motor nerve affected be the fourth, the ocular palsy is not obvious, and may be overlooked. And when there is evident paralysis of the third nerve, the vertigo resulting from it may be erroneously put down as a symptom independent of that palsy, and due to implication of a nerve centre. But be it remarked that the expression 'syphilitic vertigo' is just as warrantable as is the expression 'syphilitic epilepsy.' The expression sounds more grotesque, simply because it is novel."

* "I may here remark that I only know of one kind of change in the optic nerves from intracranial tumour, syphilitic or other, and this I call optic neuritis. There are all degrees of this change, from a climax of great swelling with hæmorrhages to white atrophy. I do not recognize a swollen or choked disc, from raised intracranial pressure. There is a swelling of the disc in some cases of tubercular meningitis and pyæmia. The swelling is, I believe, from venous thrombosis; but I have had no demonstration of it."

ON OCULAR VERTIGO ; ITS BEARING ON THE INTERPRETATION OF THE
GAIT OF LOCOMOTOR ATAXY, AND THE REEL OF DISEASE OF THE
CEREBELLUM.

DR. HUGHLINGS JACKSON thinks that from consideration of certain symptoms in cases of palsy of ocular muscles we obtain a clue to the interpretation of the real nature of disorders of co-ordination, such as the reel in disease of the cerebellum and locomotor ataxy. He finds that this has in effect been already stated by Wundt. In the "Medical Press and Circular," May 12, 1875, Dr. Jackson writes :—

"The term disorder of co-ordination is frequently used; but it is applied to diseases which are fundamentally different; for example, it is applied to chorea and to locomotor ataxy. Of course, both these *are* disorders of co-ordination; but the term is used without qualification, and this leads to the two different, indeed opposite, states being considered as alike in their physiological or functional causation. Chorea and locomotor ataxy are not only unlike in that different parts of the body are affected, but unlike in the functional affection. In the former there is 'over-function;' in the latter there is *loss* of function. In view of the active motor disorder of the ataxic patient, the statement that there is loss of function of the nervous centres for locomotion seems, at first glance, absurd. But is there not wasting of nerve fibres in the posterior column of the cord? And what could this 'cause?' It would 'cause' nothing active. It could not 'cause' the disorderly gait—in fact, it could 'cause' nothing. The disorder of co-ordination in locomotor ataxy and in some other affections is owing to a double difficulty consequent on *loss* of function of nerve tissue; there is really paralysis. There is (1) over-estimate of a movement intended to be executed by the centre diseased, but not accomplished, and (2) by healthy centres, increased action of associated movements in accordance with the over-estimate. The explanation given of the disorder of co-ordination in locomotor ataxy applies *mutatis mutandis* to the reel from disease of the cerebellum."

The following is a quotation from the *Mirror of the Lancet*, January 30, 1875 :—

"At first glance it seems absurd to speak of there being loss of power in locomotor ataxy, at any rate in an early stage of this disease. The patient has great power in his legs. Dr. Hughlings Jackson believes that there is paresis, and this only of certain highly special *movements*. As a centre (the posterior column of the cord) is affected, there could not be *loss* of power in single muscles or groups of muscles, but loss or defect in *movements*, in which several muscles co-operate. Dr. Hughlings Jackson believes that the first *movement* to fail in cases of locomotor ataxy is that in which the peroneus longus is the *muscle*

chiefly concerned. In other words, there is weakening of that most important locomotor movement which serves in throwing the body over on to the other foot, pivoting on the ball of the great toe. But by this the *erratic* gait of ataxy is not explained. We can, however, show that from local palsy or paresis we get *secondary effects*; it is here that we get the explanation. To show this, we must take a simple case from another department of clinical medicine—from ophthalmology.

“In a case of paresis of the external rectus we find more than diplopia. The patient’s giddiness and reeling gait are not due, as is commonly supposed, to double vision. There is, from an attempted but not accomplished movement of the eyeball, erroneous estimation of the *position* of objects. This is because, to use metaphorical language, the mind judges, not by the ocular movement accomplished, but by the effort to move the eyeball—judges, to use an expression of Bain’s, by the ‘out-going current.’ We note next that the strong attempt to move the paralysed or weakened external rectus leads to over-movement of an associated muscle—viz., of the internal rectus of the healthy eye; there is ‘secondary deviation’ of that eye. Applying the principle to locomotor ataxy, we should say that there is a double difficulty to be considered in the patient’s walk—erroneous estimate of the locomotor movement intended and over-action of associated movements.

“In an early stage of locomotor ataxy these ill-consequences can, whilst the eyes are open, be partly corrected by great voluntary effort, by stiffening the back and certain parts of the legs, by throwing out the arms, &c.”

LATERAL DEVIATION OF THE EYES FROM DISEASE OF THE PONS VAROLII.

IN this Journal, Feb., 1873, there are reproduced facts and remarks from Dr. Hughlings Jackson’s series of cases of intracranial tumour, from the “Medical Times and Gazette,” 1872, and *seq.* The series is being continued, and contains many facts of interest to ophthalmic surgeons.

“One case (Case 9, ‘Medical Times and Gazette,’ January 3, 1874,) is both interesting and rare. As mentioned in the last Periscope, p. 93, lateral deviation of the eyes is not a very uncommon symptom in cases of brain disease, but this was a case unusual in three respects. The deviation was persistent; it was *from* the side of the lesion; it was owing to disease of the pons varolii. The case is worthy of reference by those interested in loss of ocular movements from disease of nervous centres. A careful examination of the diseased brain by Dr. Gower is given. The following remarks appear in the number following that containing the report of the case:—

“In disease of the corpus striatum (a grave lesion) there

occurs lateral deviation of the two eyes, but the eyes turn then towards the side of the lesion, not from it, as in Case 9. It is better, however, to say that in the lateral deviation from lesion of the corpus striatum the patient cannot turn the eyes to the side paralysed. In Case 9 the patient could not turn them to the side *not* paralysed, or rather to the one least paralysed. Moreover, in cases of disease of the corpus striatum the deviation is usually transitory, unless the lesion be *very extensive indeed*. In Case 9 it was persistent. This is the only case in which I have known lateral deviation of the eyes in a chronic case. This is the only case of disease of the pons varolii in which I have encountered lateral deviation of the eyes. I have, of course, several times seen palsies of the sixth nerve, or of both of them, in cases of disease of the pons; but lateral deviation, as are other conjugate deviations, is a symptom of a very different kind from paralysis of a nerve trunk—it is due to lesion of a centre where *complex* movements are represented. I need not pursue this subject here. For a knowledge of such deviations, Vulpian's 'Physiology of the Nervous System,' and Prévôt's monograph on 'Conjugate Deviations of the Head and Eyes' should be studied."

AUTOPSY IN A CASE OF HEMIOPIA WITH HEMIPLEGIA AND
HEMIANÆSTHESIA.

A SHORT note on this subject was made in the last "Periscope," p. 101. The following is the case then alluded to in a footnote as having appeared in the "Lancet," August 29, 1874. The patient died subsequently to that report; the account of the autopsy is reproduced from the "Lancet," May 22, 1875:—

"It is now well known, thanks to Vulpian and Prévôt, and to Humphry, Lockhart Clarke, Broadbent, Russell Reynolds, and others, that from a *grave* lesion (a large and sudden lesion) of the higher divisions of the motor tract (corpus striatum and optic thalamus) there results hemiplegia, in which there is not only paralysis of the face, arm, and leg, but also deviation of the two eyes and frequently of the head. [See last 'Periscope,' p. 93, and p. 95.] The eyes, head, and face turn *from* the side paralysed, because muscles of these parts on the side paralysed can no longer balance those of the non-paralysed side. The patient has lost power to *look* towards the side paralysed.

"It is interesting to observe that hemiopia occurs in some cases of hemiplegia, and these cases seem to be the 'sensory analogues' of the above-mentioned cases in which the two eyes and the head are deviated. In the one (when the eyeballs are deviated) the patient is unable to *look* to the paralysed side; in the other, when there is hemiopia, he is unable to *see* to the paralysed side. The lateral deviation, with rare exceptions, is a

transitory symptom: the hemiopia Dr. Hughlings Jackson has discovered in a few chronic cases of hemiplegia; possibly it is sometimes transitory. Of course, cases in which the hemiopia has come on at the same time as the hemiplegia—cases of a single lesion—are alone spoken of. When the two symptoms are found after a *sudden* seizure, as in the case to be narrated, we may assume that they are owing to a single local lesion.

“Dr. Hughlings Jackson has had no* autopsy on any case of this kind. But since he thinks hemiopia in cases of hemiplegia may be overlooked, especially when the lateral fields of vision are not blind but only obscured, it is permissible to draw attention to the clinical association. We should examine the field of vision in all cases of hemiplegia when the patient's condition permits. These examinations will be of very limited value unless we at the same time note the *kind* of hemiplegia. In the few cases of which Dr. Hughlings Jackson has notes there has been considerable defect of sensation in the paralysed parts—face, arm, and leg. There has been hemianæsthesia as well as hemiplegia. It is true that in *many* cases of hemiplegia there is some defect of sensation *soon after the attack*, but it is rare to find great loss of sensation in a *chronic* case of hemiplegia; the cases of hemiplegia with hemiopia above spoken of were chronic. Another thing to be noted is, the relative degree of loss of power in which the several paralysed parts suffer. In hemiplegia, the rule is that the arm suffers more than the leg; but in some, at any rate, of the cases of hemiplegia with hemiopia, the leg suffers more than the arm—or, rather, suffers more in proportion than is common.

“Dr. Hughlings Jackson, having had no autopsy, refers to the tenth of Charcot's Lectures on Diseases of the Nervous System. From that lecture we take the following:—‘In short, we may conclude, I think, from what has been said, that there is, in the cerebral hemispheres, a complex region, lesion of which determines hemianæsthesia. We know approximatively the limits of this region; but, actually, the localisation cannot be pushed further, and no one has the right to say whether, in the region indicated, it is the optic thalamus which is implicated rather than the ‘capsule interne,’ the centrum ovale, or the third nucleus of the corpus striatum.’ In ‘Le Progrès Médical,’ Nov. 1st, 1873, is a valuable paper by Bourneville, entitled “De l'hémianesthésie liée à une lésion d'un hémisphère du cerveau.”

“Cases like the one to be now narrated have interest with regard to the elucidation of those remarkable cases of †migraine in which temporary hemiopia and temporary one-sided sensation disorder are symptoms.

* The autopsy was obtained subsequent to the publication of the life history of the case.

† See note on “Hemiopia and Coloured Vision,” &c., p. 331.

"*Anæsthesia of the right halves of the two retinæ and corresponding loss of sight in the left fields of vision; hemiplegia of the left side (of the side to which he sees imperfectly); very considerable defect of sensation of that side.*—Thomas R.—, aged sixty-five, on November 24th, 1871, at 8 p.m., felt sick, and vomited in the backyard of his house. He then went up-stairs, but after three steps he had suddenly to stop, fell against the railing of the stairs, and next became unconscious. He felt as if (with the left foot) he were treading on sponge. He was 'unconscious' for two weeks, but whether deeply so all the time is uncertain. He talked in three weeks, but for six weeks he was too ill to be left night or day. We have evidence of a sudden seizure with loss of consciousness, evidence pointing to a 'grave' lesion somewhere. The probability is, that that grave lesion is clot, but it is possibly softening from thrombosis of the trunk or of a large branch of a cerebral artery*—a large branch, because the lesion must have been a very 'grave' one.

"There has been no albuminuria to support the diagnosis of clot. It is clear, at any rate, that there was a sudden and local lesion of the right side of the patient's brain, and probably the disease is in the hinder part of the optic thalamus. The hemiplegia was discovered when the patient came round from the insensibility, but during the first fortnight it was observed that his left leg and thigh were 'as cold as a stone.'

"March, 1873.—*Examination by Dr. HUGHLINGS JACKSON.*—Motor: There is now no paralysis of any part supplied by cranial (motor) nerves, except that there is a very trifling drawing of the face to the right. The eyeballs and the head move well, in extreme movement in all directions. He can execute all large movements of the upper limb (shoulder on trunk and downwards), but they are all imperfect, feeble, and slow. The leg is more paralysed than the arm; he can walk, however, a great distance.—Sensory: There is great diminution of sensation of the left side of the body, face, trunk, and limbs. This does not follow the distribution of any nerve in particular. The whole of the left half of the head has less feeling than the right, the anæsthesia not being limited to those regions supplied by the fifth nerve. It is to be observed that the defect of sensation does not come *quite up* to the middle line of the trunk; there is about half an inch to the left of the middle line in which the feeling, if not as good, is nearly as good as on the right. (Probably the sensory nerves of the two halves of the body interlace at the middle line. Herpes zoster occasionally

* "The posterior cerebral artery has, according to Duret ('Archives de Physiologie,' Janvier, 1874, p. 81), ten branches, of which one is, in Duret's nomenclature, 'Artère interne et postérieure de la couche optique,' and another 'artère moyenne des tubercles quadrijumeaux.' Duret's researches are of great value both for the pathology and physiology of the brain."

passes the middle line slightly.) When severely pinched with the nails on the trunk or arm he has only an unpleasant sensation, and when he is pinched on the hand he feels it up the arm; 'up the marrow of the bones' is his expression. He often drops things out of the left hand—*e.g.*, if he places his stick in it in order to open the garden-gate with the right hand, the stick often falls out. He is a tailor. One day when ironing he brought the 'nose' of the hot iron against his left hand, and yet had only an 'unpleasant sensation,' although he discovered later that the skin had been severely burnt; the skin was 'pushed up' he said. He accounted for this mishap by saying that he could *not see to the left*. The left leg feels to him cold, and he has, since his illness, slept with one 'leg' of a pair of drawers on it. I have at the hospital a series of balls of the same size and appearance, but varying in weight irregularly from one of which the inside is lead to one of covered cork. He readily arranged these balls with his non-paralysed arm, but though he can lift each with the partially paralysed arm, he does not, so he says, know any difference by weight betwixt them. Dr. Tibbits assisted me in investigating the condition of electric sensibility of muscle, but we could arrive at no trustworthy conclusion.

"He is a snuff-taker, but has ceased to take snuff up the *left* nostril as 'it is of no use,' he does not feel it on that side. Snuff, of course, is an irritant, and is appreciated by common sensation, but his snuff-taking is important, as possibly the habit may have blunted the sense of smell proper. It is only possible to say from my examinations that I think his sense of smell proper is diminished. There is, as stated, hemiopia, and this is on the left (*i.e.*, the left fields, the right halves of the two retinæ being affected.) This defect of vision he found out when he came round from the insensibility. He occasionally sees only part of a word. He one day saw 'land,' the real word being 'Midland.' He remarked to his son that 'Liver' was a 'queer name,' but his son pointed out to him that it was 'Oliver.' These words were in capitals on carts in the street. I could not come to any conclusion as to taste; if affected on the left side it must be so only slightly. He is said to have been deaf of the right ear thirty-five years, and as to the left, it can only be said that his wife is sure that he does not hear so well as before the illness. He seems to me to hear well on both sides.

"1874.—His condition seems to be still practically the same. He has had what was probably a slight paralytic attack early this year, but no clear account of it was obtainable. It left no obvious permanent effects.

"The following from the 'Lancet,' May 22, completes the case:—

“ ‘In our ‘Mirror’ of August 29th, 1874, we reported a case of left (field) hemiopia with left hemiplegia, and hemianæsthesia. The patient has since died. He died after a few days’ illness, which, from his friends’ account, presented no further definite local symptoms of nervous origin. His brain was examined by Dr. Gowers, who found but one lesion. It was, as was stated in our ‘Mirror’ of August 29th to be probable, ‘in the hinder part of the thalamus opticus.’ Dr. Gowers, who did not know the history of the case, also made a diagnosis of hemiopia—a retrospective diagnosis from his examination of the brain. His report is as follows:—

“ ‘The right optic thalamus presented a considerable depression over its posterior half, where it was much softer than that of the opposite side. On section the tissue was seen to be softened, greyish-yellow in tint. The amount of softening was greatest on the inner side, the posterior tubercle (pulvinar) being broken down and destroyed, and here the softening extended up to the ventricular surface. It did not extend beyond the limits of the thalamus into the white substance of the hemisphere or the crus, and the anterior half of the thalamus and posterior extremity of the corpus striatum were intact. The microscopic characters were those of simple softening. The vessel at the base were moderately atheromatous; no occluded vessels near the softened area could be discovered. Convolutions healthy. No disease elsewhere.’ ”

GENERAL REMARKS ON CASES OF HEMIOPIA OCCURRING ALONG WITH HEMIPLEGIA.

“HEMIOPIA is not, Dr. Hughlings Jackson thinks, so rare a nervous symptom as is commonly supposed. This and the following remarks only apply to cases seen in physician’s practice, and therefore to hemiopia associated with other nervous symptoms. It occurs most often with hemiplegia. Dr. Hughlings Jackson has seen eleven* cases of this kind. Significantly the association is such that the patient cannot see to his paralysed side. To this rule Dr. Hughlings Jackson has seen no exception. He has now two patients in the London Hospital who are hemiplegic on the left, and who have lost sight entirely in their left ‘fields.’ They have been carefully examined by Mr. Couper.

“The hemiopic patient in the street runs up against people; when going out of a room he strikes his hand against the door-post; he pushes glasses off the dinner-table. Hemiopia is more especially incapacitating when it is right-sided (field), as we read and write from left to right. It is discovered in some cases of partial aphasia, but is easily overlooked. In such cases the patient’s writing, or rather attempts at writing, are a series of lines begun from the left and ending on the right, after a few

* Also two others since this note appeared.

syllables or syllable-like scrawls. Hemiopia was discovered in one of the two hemiopic patients in the hospital because he read words of the test-types on the right side of the page only. At that time it was difficult to investigate his case on account of a mental defect which Dr. Hughlings Jackson calls 'impercption.' It was very difficult to explain to him that he could read from the left side of the page by holding his book in a properly-adapted position.

"Such cases, Dr. Hughlings Jackson thinks, disprove the recent assertions as to the total decussation of the optic nerves in man."

HEMIOPIA AND COLOURED VISION PRECEDING ONE-SIDED EPILEPTIFORM SEIZURES.

TEMPORARY hemiopia and temporary one-sided development of colour are well-known symptoms of migraine. Temporary development of colours (usually red, see p. 333) is a common "warning" of an epileptic seizure as well as an initial symptom of migraine. In the following case the kinship of migraine to epilepsy seems to Dr. Hughlings Jackson to be illustrated. The report is from the "Lancet," August 14, 1875:—

"Dr. Hughlings Jackson believes that cases of migraine, and certainly those in which there are ocular phenomena with one-sided sensation disorder are (that is, according to his definition of the word epilepsy) epilepsies, for he thinks that the symptoms depend on a local excessive cerebral discharge. However, he thinks that whilst the ocular phenomena and the unilateral sensation disorder are parts of the paroxysm, the headache and vomiting are post-paroxysmal symptoms. Moreover, he believes it to be most likely that the "discharging lesion" in this epilepsy is of some parts of the cortex of the posterior lobe, that it is of convolutions, or of parts of them, which are developed out of the optic thalamus. The reason for so thinking is, that these 'sensory epilepsies' bear the same relation to hemianæsthesia with hemiopia from disease of the optic thalamus, as unilaterally beginning convulsions do to the ordinary kind of hemiplegia from destruction of the corpus striatum. Dr. Latham thinks that the paroxysm of migraine is owing to arterial contraction in the region of the posterior cerebral; Dr. Liveing, that there is in the paroxysm a 'nerve storm' traversing the optic thalamus and other centres. Dr. Hughlings Jackson's view as to localisation will be supposed to be a compromise betwixt these two opinions. It may here be pointed out that this localisation of the 'discharging lesion' in migraine accords with an old conclusion of Dr. Jackson, viz., that the anterior part of the cerebrum is the chiefly motor, and the posterior the chiefly sensory region. This speculation agrees with Ferrier's

experiments. Dr. Jackson does not, however, suppose that the separation of motor and sensory regions is abrupt. The case which follows is mixed sensory and motory. Discharging lesions may no doubt be developed in any part of the cortex cerebri from front to back.

"Whether the word epilepsy be used in the commonly accepted sense or in the novel sense, the case here reported shows the relationship of certain symptoms of migraine to epilepsy. The hemiopia is especially interesting.

"Colour development is not an uncommon precursory symptom in cases of epileptiform or epileptic seizures. It is common in migraine. In this girl's case, if her memory serves her, the colours began on the side which does not correspond to the side convulsed; one reason for thinking her account erroneous is that the transitory hemiopia was left-sided (field), as was the convulsion at its onset.

"M. B., æt. 16, consulted Dr. Hughlings Jackson in August, 1873, having had fits for six years. She walked at the age of 16 months, and talked very early. It is said that she had spasmodic croup at the age of 10 months. She was subject to attacks every winter until the age of 13. An attack would come on about ten o'clock at night, and last for two hours, when vomiting and relief came. What the real nature of this illness may have been is matter of doubt; the mother said the girl made a noise like croup, and imitated the noise of laryngismus stridulus very closely. At the age of three years it seems clear that she had a bad attack of jaundice; she was, her mother averred, delirious and insensible for two or three weeks. She had never had scarlet fever nor rheumatic fever; she had had measles, chicken-pox, and whooping-cough. No facts bearing on hereditary tendency to any kind of nervous affection were obtained.

"She seemed to be in good health. She had begun to menstruate at the age of twelve and a half years, and for the last twelve months the catamenia had been regular. There was no heart disease; there was no ear affection, nor had there been any. She had thread-worms.

"It is interesting to note that there was a clear account of gradual development of her seizures. She had at first attacks of coloured vision only for some months before anything further. There is circumstantial evidence of this. Her mother thought the child was bilious, and waited until her holidays began to give her physic. Further evidence that these mere attacks of coloured vision were really rudimentary or incipient fits was that later on she occasionally had these attacks, sometimes followed by convulsions, sometimes not. As she says, 'if the colours do not leave, the fit comes on.' After having several attacks of coloured vision only, she would have a severe fit. The colour began sud-

denly. There were red and green. The red comes first and the green was underneath the red. The background was black and the colours moved fast. Her mother said the girl always *looked to the left* when the colour appeared. This is significant, because 'when the colours do not go away,' and when the full fit comes, the head turns to the *left*, the *left* hand shakes, the arm works; there is *left-sided* convulsion. Later there is convulsion of the right side, and she is unconscious; occasionally there is tongue-biting. But here is to be stated further evidence as to gradual development of the fits. For some years she did not lose consciousness; the strong presumption is that at that time the convulsion did not pass beyond the left side, the side first convulsed; moreover, in some seizures, when she was under Dr. Hughlings Jackson's care, she did not lose consciousness, even when the fit was so severe that the left arm was invaded.

"She is certain that the colour began in the *right* side of her field of vision, and spread to the left. Moreover, some years before—no accurate date could be given—she had transitory hemiopia before the fits, but never immediately before. She might, for example, see 'half a face' at breakfast-time, and have a fit in the evening, but then in the interval the 'colours would keep coming and going.' According to the mother, the child could see to the right when hemiopic—that is, the left was the blind field. On one occasion she, over a period of a few days, occasionally saw on the left side an object of about the shape and size of an octavo page, dotted all over with rounded dots closely set. This was, she said, 'instead of the colours.'"

COLOUR.

IN some chapters on Epilepsy ("Med. Press and Circ." 1874—75), Dr. Hughlings Jackson adverts to the double use of the word Sensation. It is used both for mental states and for the physical states of the nervous system which persist during those mental states. Thus it is used for colour and for the molecular changes which occur in the retina optic nerve and higher centres when there is the mental state, colour. Similarly, a sudden development of coloured visions is sometimes erroneously compared with spasm of muscles, as if the two things were analogous. Speaking of sudden and paroxysmal development of the colour red as being equally as convulsive the result of a cerebral discharge (and in his nomenclature an epilepsy), Dr. Hughlings Jackson writes:—"The word 'red' is really a name for a mental state. The proper comparison is therefore not betwixt the sensation of redness (mental state) in an epileptic discharge in a convulsion (physical state). This would be to compare two things which are utterly different. The comparison, physiologically, would be betwixt abnormal excitations of optic centres and nerves and abnormal excitations of motor centres

and nerves. We cannot observe the results of excitation of 'sensory' nerves and centres. We have to rely on what the patient tells us, and, of course, he can only tell us of what occurs before he loses consciousness; we can observe the results of excitation of motor centres and nerves after he has lost consciousness."

The comparison is not betwixt colour and any kind of physiological conditions of a motor nerve. Psychologically, the comparison is betwixt colour and shape, and physiologically betwixt excitations of sensory nerves and centres and excitations of motor nerves and centres.

Speaking more generally ("Med. Press and Circular," Dec. 2, 1874) on the distinction betwixt mental and physical states, Dr. Hughlings Jackson shows how the distinction is neglected in cases of vertigo, as well as in cases of coloured vision. As the illustration of vertigo given is ocular vertigo, the remarks may be fitly reproduced here.—"If we consider the facts of the vertigo attending palsy of the ocular motor nerves, we see plainly that it is a *motor* symptom. It is, however, sometimes spoken of as a sensory symptom, because a 'sensation' attends it. It is one of those disorders of co-ordination which has a subjective side. But the 'sensation' in this case is a state of mind, and states of mind may arise during energising of motor as well as of sensory nerves and centres. Our direct concern is with the physical process which goes on in the nervous system whilst the 'mental state,' which is a feeling of vertigo, continues; it is the physical process which is a disorder of motion—actual or nascent. There is as much difference betwixt the sensation or feeling the giddy man has and the physiological process which goes on in his nervous system, as there is betwixt pain and the changes in the sensory (afferent) nerve which exist whilst the pain lasts, or as there is betwixt the colour red and the changes in the optic nervous system associated with it."

Dr. Hughlings Jackson then quotes John Stuart Mill on the matter; colour and its physical substratum being the illustration Mill gives. This quotation should be carefully considered by those who write as if what begins as molecular vibration, or some physical change, in the retina and optic nerves, fines away into sensation of colours, *i.e.*, a physical into a mental state.

"Let it be shown, for instance, that the most complex series of physical causes and effects succeed one another in the eye and in the brain to produce a sensation of colour; rays falling on the eye, refracted, converging, crossing one another, making an inverted image on the retina, and after this a motion—let it be a vibration, or a rush of nervous fluid, or whatever else you are pleased to suppose, along the optic nerve—a propagation of this motion to the brain itself, and as many more different motions as you choose; still, at the end of these motions, there is something

which is not motion, there is a feeling or sensation of colour. Whatever number of motions we may be able to interpolate, and whether they be real or imaginary, we shall still find, at the end of the series, a motion antecedent, and a colour consequent."—(Mill's *Logic*, vol ii, p. 436.)

THE ANATOMICAL SUBSTRATA OF VISUAL IDEAS.

DR. HUGHLINGS JACKSON has long taught that the convolutions, like the inferior nervous centres, represent impressions and movements. In other words, he believes that the unit of composition of the nervous system from the lowest to the highest centres is a sensori-motor arrangement. He thinks it to be clearly so in the case of the substrata of visual ideas. He urges that, in actually seeing, there is concerned a retinal impression and an ocular movement; in thinking of (ideal seeing) an object there is concerned a nervous arrangement which represents these two elements, the motor as necessarily as the sensory.

There are three qualities in bodies: secondary or dynamical, primary or statical, and secundo-primary or statico-dynamical. The secondary or dynamical properties are estimated by sensory nerves and centres; the primary or statical are estimated by motor nerves and centres. Dr. Hughlings Jackson supposes the secundo-primary or statico-dynamical properties to be estimated by impressions and movements represented in the cerebellum; of these, nothing is said in this note (see p. 338).

The colour of an object is, on its physiological and anatomical side, simply an affair of the retina and other higher sensory centres therewith associated; on the other hand, its size and shape are estimated by ocular movements.* So far for acquiring visual ideas of objects for actually seeing them. But when we have seen an object we can see it again ideally, or, in synonymous terms, "think of it." Dr. Hughlings Jackson believes (in accordance with the opinions of Spencer and Bain) that the ideal seeing is a repetition of the actual seeing, with a difference corresponding to the difference that one is a faint mental state, the other a vivid mental state. In thinking of objects the central discharge is (1) sight, and (2) limited to the centre. In actually seeing them it is (1) strong, and (2) spreads from periphery to the centre and from centre to periphery.

In short, he believes that the anatomical substratum of the idea of an object consists of two elements, a sensory and a

* It is understood, of course, that the estimation by the eye is symbolic. On the association of ocular movements with tactual movements, as evidenced by cases of hemiplegia with lateral deviation of the eyeballs, see last *Periscope*, p. 97. The association of hemiopia with hemi-anæsthesia is similarly significant (see last *Periscope*, p. 101, and note in this *Periscope* on Autopsy in a case of Hemiopia with Hemiplegia and Hemi-anæsthesia).

motor. Speaking of visual ideas, the substratum represents a particular retinal impression and also a particular ocular movement.

The following, from the "Medical Times and Gazette," May 29, 1875, refers to the same subject. As the opening sentences show, it is from a paper dealing generally with the representatives of movements in the cerebral convolutions:—

"To myself, who have for more than ten years been teaching that convolutions represent movements, it naturally comes easy to believe that the experiments of Hitzig and Ferrier are a demonstration that this is the anatomical constitution of certain of them. Those who have read the quotations above given, will not accuse me of affectation when I say that I was surprised that any one hesitated to accept the conclusions of the recent experiments. My own opinion is that the prevalent confusion of psychology with the anatomy and physiology of the nervous system is much to blame for the incredulity. 'Centres for ideas' are often spoken of, but nothing at all is said of the *anatomical* substrata of any class of ideas. I hold that the anatomical substrata of ideas are sensori-motor arrangements. It seems to me to be plain, almost to demonstration, that there *must* be a motor element in the substratum of a visual idea. How else could we possibly have ideas of the *shape* and *size* of an object? I beg the reader to take note that this is not an after-thought. I do not write this because Hitzig and Ferrier find that they develop movements of the eyes by electrical excitation of certain parts of the cerebral cortex. I believe that movements of the eyes must be represented in the cerebral hemispheres before their experiments were begun. Before it was surmised that movements could be produced by artificial excitation of the brains of healthy animals, I wrote as follows ('Medical Times and Gazette,' October 23, 1869) of the anatomical substrata of visual ideas:— 'In the organised forms which serve as the mental representatives of objects when the objects are absent, there will therefore be comprised not only impressions of surface, *but residua of movements*. . . . The speculation supposes that we have particular visual impressions in fixed association *with particular ocular movements*. A convulsion in which the eyes are strongly deviated is owing to an excessive discharge of a part where the motor elements of the substrata of visual ideas are largely represented."

ON THE MOST GENERAL MODE OF REPRESENTATIONS OF THE MOTOR AND SENSORY ELEMENTS OF VISUAL, ETC., IDEAS.

IN the same series of paper, Dr. Hughlings Jackson puts forward a speculation as to the most general mode of representation of the motor and sensory elements which enter into the substrata of ideas—visual ideas being the illustration. He thinks (quoting

from an abstract of one of his Gulstonian Lectures, "Brit. Med. Journal," March 6, 1869), that "*facts seem to show that the fore part of the brain serves in the motor aspect of mind, and we may fairly speculate that the posterior serves in the sensory.*"

This speculation seems to him to accord with one of Ferrier's conclusions from his experiments. The following is a quotation from a summary of Ferrier's researches, "Med. Record," March 18, 1874:—"The whole brain is considered as divided into a sensory and motor region, corresponding to their anatomical relation to the optic thalami and corpora striata and the motor and sensory tracts."

Thus, Dr. Hughlings Jackson thinks that, for the most part, the sensory and motor elements of the substrata of ideas are *represented apart*. The meaning of this separation, Dr. Hughlings Jackson suggests, is that the sensory and motor elements which enter into the physical side of what is, psychologically speaking, our perception of the statical and dynamical qualities of objects, can be, so to speak, transposed—can enter into new combinations. After seeing a red circle and a blue square, we can *think of* a red square and a blue circle. The separation is never absolute. It is impossible, for example, to think of redness only. In accordance he speaks of the *chiefly* motor and sensory regions. Yet we can think of red things of innumerable forms.

The principle is, he thinks, capable of extension in various degrees to all the higher mental operations—to all complex states betwixt the organism as acted on (chiefly sensation side), and the organism as reacting (chiefly motion side),* and accounts for what takes place, anatomically and physiologically, during the mental process, which, beginning as metaphor, ends in abstraction.

ON COLOURED VISION AND SPASM OF OCULAR MUSCLES IN EPILEPTIC OR EPILEPTIFORM SEIZURES.

It was stated in a former note, p. 335, that when we see an object (vivid mental state) there is both a sensory and a motor process, and that what is left when the object is removed, is also a permanent modification in both a sensory and motor element. When (faint mental state) we think of the object ("remember it," "become again conscious of it," "see it ideally," &c.) what occurs is a slight and central excitation or discharge of these two modified elements. Now, having re-stated this we can consider what occurs when there is an *excessive* discharge of centres containing crowds of these elements. It is to be noted that (see p. 336) the two elements are supposed to be represented widely apart. Hence from cerebral discharges we may have almost solely sensory phenomena (ocular spectra, and unilateral dys-

* All modes of consciousness can be nothing else than incidents of the correspondence betwixt the organism and its environment.—Spencer.

æsthesia, as in some cases of migraine. See note, p. 332) or we may have almost solely motor phenomena, as in lateral deviation of the eyeballs and convulsion of the face, arm, and leg. —(See note in last Periscope on Correlations of Movements of Eye and Hand, p. 95.)

We consider now what occurs when there is such a discharge of the substrata of visual ideas as occurs in an epileptic fit. The following extract (Med. Press and Circular, Nov. 4, 1874) gives Dr. Hughlings Jackson's views on the subject. After considering what occurs during the discharges when we have vivid visual ideas (see things actually) and also what occurs during the discharges when we have faint mental states (see things ideally) he writes:—

"Now for the epileptic discharge. *It must never be forgotten that it is an excessive discharge.* Not only is it very much more excessive than the discharges which occur when we have faint mental states, but it is very much more excessive than those occurring in vivid mental states. Besides being excessive, it is of a limited part of the brain. It is rapid, and it is soon over. In such excessive discharges as the epileptic discharge of our supposed centres for visual ideas there could not be a development of ideas of objects either of such ideas as occur in health or of such as occur in delirium and insanity. We have, however, to do with what occurs physically. We have to do with epileptic discharges of those *sensori-motor processes* which are the *anatomical side of ideation*. There is in some cases of epilepsy evidence of excessive excitation of parts of the brain representing retinal impressions, as the patient has clouds of colour before his eyes. There often occurs also, as part of a larger fit, that clotted mass of movements of the ocular muscles which we call spasm (for example, strong lateral deviation of the eyes). In the first case there is, I believe, a sudden and excessive discharge of a limited part of the cerebral hemisphere, which contains crowds of the sensory element, and in the second, of a limited part of the cerebral hemisphere which contains crowds of the motor element, in the highest processes of the series for visual ideas. The discharge in the epilepsy being very strong, rapidly spreads down to the lower centres, and by these to the muscles, and thus produces innumerable ocular movements at once, or rather jams innumerable ocular movements into one stiff struggle.

By the severe discharges which *begin* in the substrata of *visual* ideas the substrata of other ideas are *reached*; but it is convenient to limit the illustration.

REPRESENTATION OF OCULAR MOVEMENTS IN THE CEREBELLUM.

As stated in the Periscope of last No. (foot note pp. 94 and 95), Dr. Hughlings Jackson believes that certain of the ocular move-

ments—those for the estimation of distance are represented in the cerebellum. This to some extent accords with certain of Ferrier's conclusions. The following is part of a preface to a reprint of Dr. Hughlings Jackson's paper on "Localization of Movements in the Brain."—(Reprinted from the "Lancet," 1873.)

"I believe that all the muscles of the body are represented in the cerebellum, as all are in the cerebrum but in different order: I spoke chiefly of the representation in the cerebellum of movements of the eyes, and at the same time for the sake of contrast of the representation of ocular movements in the cerebrum. I quoted Adamük and Donders to show that the parallel* movements of the eyes which Hering and Donders think are for direction, are represented in parts of the corpora quadrigemina different from those parts of these nervous centres, where movements of adduction and abduction of the eyes, which they suppose to be for estimating distance, are represented. I suggested that the former, which I consider to be the movements for estimation of Extension, are *re-represented* in the cerebrum. It has, indeed, long been well known that lateral movements of the eyes are represented in the cerebrum (Vulpian, Prevôst, &c.). I suggested also that the movements for distance,† and I would now add for depth and resistance, are re-represented in the cerebellum (see Section 17).‡ These two orders of movements occur together in health, but disease separates them. Thus there is loss of the lateral movements of the eyeballs in some cases of disease of the cerebrum; from extensive disease of one side of the cerebrum, we have loss of *one half of* the lateral movements of the two eyes. In order to understand loss of one half of the ocular movements for estimation of distance by disease of one side of the cerebellum, we must note that there is something more than mere convergence. The movement of the eyeballs in estimating distances is a complex one. Besides alteration in the size of the pupil, and difference in tension of the ciliary muscle, there is convergence and divergence of the visual lines.§ It must be particularly noted that in convergence the eyes are

* Unfortunately I said "side to side" movements, instead of "parallel."

† Ferrier's experiments seem to me to show that this speculation is correct.

‡ These ocular movements are supposed to be *symbolic* of distance, depth, and resistance, statico-dynamical properties, estimated by locomotor movements. I use the word locomotor in an unusually wide sense. When I put out my hand to feel the surface of a book, my putting forth the hand is, I consider, an act of locomotion, and it is, I think, a cerebellar movement. The movements of my finger ends over the book (tactual) are cerebral movements, and serve in the physiological process of giving me notions of superficial size and shape. The former go with an act of convergence of the eyeballs, the latter go with the concomitant sweeping movements of them.

§ It seems to me that Loring's experiments demonstrate that the external recti are *in action* in looking into the distance. Indeed, it would be a very exceptional thing if there were not *action* of both external and internal recti,

directed slightly downwards, and in divergence upwards. Now it is an old-established fact that, as is stated in Section 17, in lesions of the right middle peduncle of the cerebellum there is a skew deviation of the eyes. The right eye is turned upwards and inwards, the left downwards and inwards. This seems to me to be loss of *one-half* of the movement for the estimation of distance. Only one-half, for there is a one-sided lesion only. It will, I think, be seen that the speculation as to the representations of these ocular movements, see Section 17, is verified by some of the results of Ferrier's experiments on the cerebellum. And the further speculation (Section 17) that these movements are by nervous arrangements in the cerebellum, associated with movements of locomotion, goes also with Mr. Spencer's hypothesis that the cerebellum is the organ for doubly compound co-ordination in space."

THE EYE AND EAR IN THE ESTIMATION OF SPACE AND TIME.

IN the Hospital Reports of the "Medical Times and Gazette," August 7, 1875, are some remarks by Dr. Hughlings Jackson, on the movements associated with hearing. In a former note (p. 325), it was pointed out that movements of the eyes are essential in the estimation of Extension (size and shape). In the following extract movements associated with the auditory nerve are spoken of as being essential in the estimation of Intervals. It is given here as it bears indirectly on the matter discussed in the note on the Anatomical Substrata of Visual Ideas. (See p. 335.)

The auditory nerve is in two divisions; one, the cochlear, Dr. Hughlings Jackson thinks (having regard to Lockhart Clarke's researches) is afferent to centres in the medulla oblongata for movements of the heart, and the other (the tripartite division for the semi-circular canals) is afferent to centres for locomotion in the cerebellum.

"So far we have spoken separately of the two divisions of the auditory nerve as if one were an auditory and the other a sensory-locomotor nerve. We now consider their possible relations to one another. If it be, as above suggested, that the cochlear and the canal divisions of the auditory nerves are afferent respectively to the heart and to the movements of the head and neck (and thus indirectly to locomotor movements), we see that the compound nerve which is called 'auditory' has, saying nothing of the tensor tympani and stapedius muscles, much muscularity in dependence on it. Yet it differs notably from the eye, for the movements of the eyes are comparatively independent of those of the rest of the body—require translation into them,—while the movements which we are supposing to be associated with the ear are those constantly serving the organism as a whole. That both in divergence and convergence. There is, as Duchenne points out, a co-ordination of antagonism, as well as a co-ordination of co-operation.

is to say, the movements of the head and neck, are the first and most important of locomotor movements; the heart is the most central of all organs. It is exceedingly important to note the double association of movement. For the fact of association of the ear and circulation bears on the anatomico-physiological process which goes on whilst we acquire ideas of Time. The ear is not merely for the estimation of sounds, but of Intervals; just as the eye is not merely for the estimation of colours, but of Extension. That the ear has to do with time as the eye has to do with space, is, of course, a truism; but we wish to point out the importance of rhythmical *movements* in the estimation of time by the ear. Let us first consider the analogous case of the eye and space. We could have no notion of extension by mere impressions on the retina; there must be movements of the eyeballs. (See note p. 336). *To suppose that we know the shape of an object by the merely sensory process of an object, as it were, imprinting itself on the retina, is to suppose that the position of the several retinal elements in relation to one another is known already.* These can only be learned by movements. Similarly, to say that, since the ear receives sounds in succession, this kind of reception gives one an idea of their time-relation, assumes that particular intervals are already known. Dr. Hughlings Jackson believes that intervals are learned by movements of the heart; that our ideas of time have final, although unconscious, reference to the rhythm of the heart, as our ideas of space have to movements of our locomotor organs.

"If this hypothesis be true, its bearing on the process for the estimation of distance is important and obvious. The auditory is a nerve which is partly afferent to a rhythmical, time-dividing organ, and partly afferent to leading locomotor movements of the whole body. To those *born blind*, Platner says, time serves instead of space; those who can see, as it were, sum up by the eye large space travelled over by *successive* movements of the whole body. Those born blind estimate distance by the time it takes to pass from place to place; and the time will, the hypothesis is, be measured by the duration, number, and intervals of locomotor movement, estimated by movements of the heart, associated with the division of the auditory nerve for the semi-circular canals.

"The above speculation seems to Dr. Hughlings Jackson to harmonise with what Spencer has written as to the estimation of time by organic rhythms. The following quotation may be read in connection with the foregoing; it is from the first volume of 'Spencer's Psychology,' page 217:—"A stationary creature without eyes, receiving distinct sensations from external objects only by contacts which happen at long and irregular intervals, cannot have in its consciousness any compound relations of sequence, *save those arising from the slow rhythm of*

its functions. Even in ourselves the respiratory intervals, joined sometimes with the intervals between the heart's pulses, furnish part of the materials from which our consciousness of duration is derived; and had we no continuous perception of external changes, and consequently no ideas of them, these rhythmical organic actions would obviously yield important data for our consciousness of time—indeed, in the absence of locomotive rhythms, our sole data.”

COLOURED VISION IN AMAUROSIS AND EPILEPSY.

THE following may be read in common with previous remarks on Coloured Vision, in our last Periscope, page 91. It is from the Hospital Reports of the “Lancet,” January 16, 1875.

“Patients who are blind or partly blind from atrophy of the optic nerves are not always in darkness; they may be in redness. The following is a note by Dr. Hughlings Jackson of a case he saw in private:—“Some years ago I saw a patient with defect, not loss, of sight, from simple atrophy of the optic nerves, who said his sight sometimes became ‘blood-red,’ and would be so all day. He was tormented by this, and spoke of it as being ‘frightful,’ ‘terrible.’ He had not always the coloured vision. One day he remarked to me: ‘To-morrow is not a red day—it is a dull, dark day.’ So that it would seem there was some kind of order in the intermissions. It is worth notice that his coloured field was broken by black lines and dots. Most unfortunately I had no note of the patient’s power of *seeing* colours, which might, perhaps, have been roughly tested in the intervals of his coloured sight. The probability is that the patient would at no time during his defect of sight have been able to see red. The attacks of red sight were analogous to attacks of spasm. Now, it is certain that spasm attacks, as it were, *by preference* those parts which are most subject to paralysis, and will attack parts already partially or even completely paralysed. Thus we should by analogy expect that the colour first lost and the one first developed would be the same.”

It is understood, of course, that the comparison spoken of is, strictly speaking, betwixt excitations of sensory and motor nerves and centres; the comparison of development of *colour* with *spasm of muscles* is nonsensical, for colour is a state of mind. [See note on Colour, p. 333.]

“When colour development is a warning of an epileptic seizure, the colour developed is, Dr. Hughlings Jackson thinks, generally red. It is not always so.”

This was remarked on in the last Periscope, p. 91. Dr. Hughlings Jackson says he finds that Falret has long since noticed that a premonitory symptom or beginning of an epileptic seizure is often red vision, but then Fabret says too, “or purple,”

which colour is a mixture of the extreme colours red and blue (see next note).

WARNING (AURA) OF COLOURED VISION IN RELATION TO EPILEPTIC
"DREAMS," AND TO EPILEPTIC MANIA.

THE following is from the same number of the "Lancet," but contains additional sentences:—

"In chronic conditions of mental impairment it seems certain that 'subjective' sensations are factors in producing delusions. Thus a lunatic who has subjective smells may think his food is poisoned. He imagines the smell to be in the food itself. So far for chronic cases. The temporary subjective sensations which usher in an attack of epilepsy probably give a turn to the temporary mental disorder at the onset of and after the paroxysm. One of Dr. Jackson's patients had fits *beginning in his thumb*, and used, as he became unconscious, to cry out that his thumb was coming off and that blood spurted out of it. The presumption is that he had an 'aura' of red vision. After the fit, but before he was fully himself, he saw blood all over his clothes. Another patient who had an aura of colour next 'saw faces,' and then went off into convulsions. The probability is that such subjective sensations, which are practically external, develop or give a turn to dream-like states preceding complete loss of consciousness, or to the delirium or mania sometimes following the paroxysm. To make this clearer let us state the usually accepted theory of dreams. It is believed that they are developed by some external irritation, as for example, a noise, or by some peripheral irritation, for example a sore throat or a cramp in the finger. Taking the last illustration; the cramp develops a dream that a cat is biting the dreamer's finger. Similarly when a patient after an epileptic fit is in a condition which is the pathological analogue of the condition in sleep, the development of the colour red probably causes dreadful dreams of blood, flames, &c. (Vide *infra* quotation from Falret.)

"Colour sensations are far commoner than sensations referred to the other senses, that is to say, the most special sense is the one most often affected. And of colour, as stated, 'red' is the one most often developed. Dr. Hughlings Jackson finds that Falret has remarked on the frequency of red vision in epileptic maniacs. He says 'they constantly see luminous objects, flames, circles of fire, *and what is worthy of remark the colour red or the sight of blood* frequently predominates in their visions.'"

THE CAUSES OF MYOPIA.

DR. SCHNABEL (of Vienna), in a long paper on this subject, discusses the views already held. That myopia does not depend

on over-work of the eyes merely, he thinks is shown by the number of myopes who have never used their eyes for observing small objects at all. He objects to the view that spasm of accommodation causes myopia. The number of those who use their eyes constantly on fine work (and who would be liable to spasm) and the hereditariness of myopia, would make myopia the prevalent condition, emmetropia, &c., the exception. The theory of inflammatory changes is not sufficient. The external conditions under which myopia may develop may differ in *toto*. We must look at the cases in which no strain of accommodation has occurred to find an explanation of the cause of myopia. He believes that in all cases there must be a congenital predisposition, which may remain latent for years. The fact of hereditary transmission supports this view. It is remarkable that myopes should be so liable to spasm of accommodation, because they use their accommodation so little. In hypermetropia, or where the accommodation is used, we get asthenopia. He criticises Dobrowolsky's statements as to the degrees of myopia most commonly associated with spasm. Dr. Schnabel gives the results of his examination of 210 eyes. He did not select the patients. They were young people in various occupations, mostly requiring steady-looking at fine objects, and whom he could examine repeatedly. He found 120 myopic, 40 hypermetropic, and 50 emmetropic. In only 89 did he use atropine, as he found he could estimate the refraction exactly with the ophthalmoscope without atropine. In none of the hypermetropic eyes was there any permanent spasm of accommodation, though he found one in which a sixth of hypermetropia (manifest to the ophthalmoscope) was not apparent when the patient looked at distant objects. The exercise of accommodation which enables a hypermetrope to see in the distance does not come under the character of "spasm." It is called forth in the attempt to see, and relaxed as soon as the attempt is deviated from. The inability to use the convex glasses corresponding to the amount of the hypertropia never depends on inability to relax accommodation, but on the relation between convergence and accommodation, in consequence of which a certain amount of accommodation is exercised in fixing a distant object, and this is neutralised by the use of convex glasses. As soon as a hypermetrope looks vaguely into the distance without fixing any object, the accommodation is at once relaxed, and the highest degrees of hypermetropia may be estimated by the ophthalmoscope. If during this examination the patient looks at a definite object, the hypermetropia ceases to be manifest, but becomes apparent immediately the patient ceases to fix. This shows how very little habitual spasm of accommodation will account for the symptoms. He did not meet with any case of myopia (ophthalmoscopic) which after the use of atropine was found to be emmetropia or hypermetropia. He has

never met with a case of persistent involuntary spasm of accommodation. He criticises cases already recorded, and the symptoms generally given of spasm. In many, the difference in refraction before and after atropine was exceedingly small. Dr. Schnabel thinks it quite probable that a young, soft lens, after repeated compression in the exercise of accommodation in hypermetropia, may take some time to recover its proper shape when the accommodation is relaxed. When speaking of the estimation of refraction by the ophthalmoscope, he points out that considerable differences often exist between the disc and the yellow spot, and even between different parts of the same disc. Dr. Schnabel then passes on to consider whether myopia depends at all on exercise of accommodation. He uses the term "*Staphyloma posticum*" to indicate elongation of the eyeball, and "conus" to indicate the so-called "crescent." He does not believe that the cone depends on inflammatory changes, or on the traction exercised on the choroid in accommodation. The cones often exist in eyes which have never been used for fine objects. Moreover, the traction, when exercised, would not account for the cone. The part where the cone is invariably situated is that least affected by the traction. The mode of increase is different from that which traction would explain. The cone should be commonest in hypermetropia where the greatest accommodation is exercised. Out of 210 eyes examined cones were present in 135, and 99 of these were myopic, 18 emmetropic, and the other 18 hypermetropic. He only met with twenty-one myopic eyes without cones. It is certainly more common to meet with non-myopic eyes with cones than myopic eyes without them. It is exceptional to meet with them in hypermetropia where accommodation is constantly exercised, and the custom in myopia where accommodation is not required. Cones are present in hypermetropia without asthenopia, and absent in myopia with most troublesome asthenopia; present in myopic eyes only used for large objects, and absent in those used for fine work. The theory that the cones depend simply on atrophy of the choroid dependent on elongation of the sclerotic, and, for anatomical reasons, most developed to the outer side of the disc, meets many of the difficulties. This will not account for the presence of cones in hypermetropia and emmetropia; for, if the size of the cone bears any relation to the elongation, in many cases the latter would have to be so extreme as to be incredible. He thinks we must fall back on a congenital anomaly. The cone represents an enlarged blind spot, the margin of which accurately corresponds to that of the cone. The percipient elements, as well as the pigment layer, are wanting. The congenital cone is analogous to a coloboma. In the acquired cones, the pigment layer is wholly wanting over the interval between the margin of the disc and the semicircular

pigment line forming the boundary of the cone. The stroma of the choroid is not infrequently still in good preservation. It is impossible to explain this on the theory that the atrophy of the choroid is the sole cause of the formation of the cone. Dr. Schnabel thinks that, in consequence of the stretching of the sclerotic the margin of the pigment layer is drawn away from the disc by the pigment layer moving over the choroid. When the elongation occurs, the pigment layer is insufficient to cover the stretched subjacent membranes, and a kind of window is formed at the margin of the disc. The part of the fundus deprived of the pigment layer will therefore be bounded on the one side by the disc, and on the other by a semicircular pigment line, and will be situated on the side of the disc corresponding to the summit of the staphyloma. It is usually on the outer side, because the greatest elongation occurs in the region of the macula lutea. In a congenital *conus* the choroid also is wanting. It is often easy to detect that a cone is spreading by the differences which can be made out between different parts of it. There are other changes liable to be confounded with cones. In the latter the margin of the disc next them has no pigment, and the area of the cone is insensible to light. He describes certain changes met with in the eyes of old persons which may be mistaken for cones. In regard to the causes of the acquired stretching of the sclerotic, Dr. Schnabel gives reasons for disbelieving in an inflammatory origin. Increased intra-ocular pressure he cannot regard as a cause, because this would take effect at the lamina cribrosa. He can only attribute the staphyloma to a congenital predisposition; that is, to a particular condition of the sclerotic. The hereditariness of the affection points in this direction, and it often goes with a particular build of the frame. It is very common in certain countries. In Italy, for instance, and yet there 80 per cent. of the people cannot read or write. It is well recognised that certain physical peculiarities which have been inherited may not develop till a certain age, and so it may be with myopia. A predisposition being granted, it is of course comprehensible that various causes may hasten the development: such as application to fine work, but the precise influence of each factor involved is unknown. If the predisposition is great, the myopia will develop, though the eyes have not been used for fine objects at all. This explains the apparent anomaly that the largest "cones" may be met with in such people. An eye which was originally hypermetropic or emmetropic may ultimately develop myopia in obedience to predisposition. He mentions a case in which a patient, 18 years old, was found to be emmetropic, whilst, five years previously, he was distinctly hypermetropic ($\frac{1}{8}$ th). There was no "cone" present.—("Græfe's Arch. f. Ophth." Bd. xx, Abth. ii.)

APPARENT MYOPIA.

A CASE of apparent myopia in a lad, 17 years old, is recorded by Dr. Leopold Weiss. The myopia amounted to about $\frac{1}{36}$ on trial with glasses before and after atropine, but the ophthalmoscope showed emmetropia. The patient could see better in the distance after atropine. He was not sufficiently long under care to show results of treatment.—("Zehend. Klin. Monat.," xiii, April, p. 124—132.)

THE LENGTH OF THE AXIS, AND THE RADIUS OF CURVATURE OF THE EYE.

DR. LANDOLT gives a method of calculating the length of the eye, and thus of distinguishing between myopia from elongation and that from excess of refraction.—("Annales d'Oculistique," Jan., Fév., 1874, p. 49.)

PARESIS OF ACCOMMODATION, WITH APPARENT MYOPIA.

A PATIENT, aged 39, under the care of Dr. Schapringer, had a blow on one eye, after which he appeared slightly myopic for distance, but unable to read small print. Convex glasses were given for reading, and weak concaves for the distance. In a short time he could see well without concaves for distance.—("Archives of Ophth. and Otol.," vol. iv, No. 1.)

CHANGES IN REFRACTION IN A CASE OF IRITIS SEROSA.

DR. PFLÜGER records a case of serous iritis, in which the refraction varied from myopia $\frac{1}{30}$ to $\frac{1}{7}$.—"Zehend. Klin. Monat.," xiii, April, p. 108.)

TWO CASES OF MYOPIA ARISING FROM ACCIDENTAL LUXATION OF THE LENS.

THE cases are recorded by Dr. Pflüger. In the first, after some other effects of the injury had passed off, it was found that the lens occupied an oblique position slanting downwards and backwards. The patient could read $1\frac{1}{2}$ Sn. at $3\frac{1}{2}$ ". With -4 s. and -2 cyl. axis, horizontal V. = $\frac{2}{80}$. In the second case, the lens was rotated on its vertical axis, the inner margin being posterior and the outer anterior. The patient was not sufficiently intelligent to allow of an examination for astigmatism being carried out. He saw small objects best at $4\frac{1}{2}$ ", and best in the distance with -5 . In each case the pupil was widely dilated. The author alludes to two similar cases recorded by Manfredi, and says the cases give support to Helmholtz's theory of the mechanism of accommodation.—("Zehend. Klin. Monat.," xiii, April, p. 109.)

THE CILIARY MUSCLE.

DR. WARLOMONT publishes an article on the ciliary muscle (written for the "Dictionnaire Encyclopédique des Sciences Médicales") in the "Annales D'Oculistique, Mai, Juin, 1875, p. 195—249. He discusses its anatomy (with illustrations) in the human subject, in various states of refraction; its comparative anatomy, its physiology and pathology. Under the latter heading he treats (1) of insufficiency—physiological (excited and spontaneous) and pathological; the latter, again, including paralysis (diphtheritic, &c.) and paresis, with the treatment of these affections. (2) Excessive tonicity—physiological (excited and spontaneous) and pathological—including "dynamic myopia." (3) Hyperæsthesia of the ciliary muscle. (4) Neuralgia of the ciliary muscle, acute and chronic.

THE UNIT OF ACCOMMODATION.

PROF. HASNER, of Prague, in a paper ("Ueber die Accommodationseinheit") in "Zehend. Klin. Monat.," xiii, Jan., Feb., März, p. 1—4 and 88—90, advocates a new formula for representing the amount of accommodation exercised.

EMPLOYMENT OF CALABAR IN THE TREATMENT OF ASTHENOPIA
ACCOMMODATIVA.

DR. HUGO MAGNUS contributes a paper on this subject.—("Zehend. Klin. Monat.," xii, Aug., Sept., p. 303.)

SPASM OF ACCOMMODATION.

DR. J. STILLING records five cases of spasm of accommodation. In three, the affection occurred in connection with febris intermitiens larvata. The first patient was 67 years old. During the attacks of spasm, symptoms were produced like those after instillation of Calabar in cases of paralysis of accommodation. The second patient was 30 years of age. The spasm occurred in connection with supra-orbital neuralgia, of an intermittent type. The third patient was a man, aged 22, suffering from conjunctivitis attended by severe pain in and around the eye, of an intermittent type. The fourth was a girl, aged 12, suffering from spinal irritation, orbital neuralgia, &c. In the fifth case, the patient, a man, could excite the spasm at will, by pressure on a particular part of the eye.—("Zehend. Klin. Monat.," xiii, Jan., Feb., März, p. 5—30.)

THE CLINICAL DETERMINATION OF ASTIGMATISM.

IN the "Annales d'Oculistique," Mai, Juin, 1875, p. 298, is an abstract of a thesis, by Dr. Justin Weil, in which it is mentioned

that M. Bravais (of Lyons) has suggested a new test for astigmatism. If, when examining an eye with the ophthalmoscope and the disc is in view, we move the lens from side to side we shall find that the image of the disc moves also. The degree of movement will depend on the state of the refraction. If the eye be myopic, the image moves less than the lens; if the eye be hypermetropic, the image will move more than the lens; if the eye be emmetropic, the image will still be seen through the centre of the lens, as the movements will be equal. This test may be applied in the direction of the different meridians and thus astigmatism may be detected. The movement of the image is recognised by its relation to the borders of the lens. M. Bravais has also constructed an apparatus—a monocular astigmometer which renders the eye myopic—consisting of a tube with a convex lens of shorter focus than the tube. The latter is terminated by a screen pierced by a small round opening giving passage to the rays of a lamp. If the eye is astigmatic, the aperture will appear oval, the long axis corresponding with the direction of the meridian of greatest curvature. In the interior of the tube is a second lens which rotates on a pivot and can be turned from the outside. The axis of rotation of this lens is placed in the same direction as the long axis of the oval, and the lens is rotated till the aperture appears round. The degree of obliquity of the lens is shown by a needle, and the focus of the cylindrical lens represented by the obliquity of the lens is read off on a scale previously calculated. Or, the observer (if emmetropic) himself looks in the tube when the asymmetry is corrected, and of course sees the aperture oval in the opposite direction, and may then find the cylindrical glass required to enable him to see it round.

THE ESTIMATION OF THE STATE OF THE REFRACTION BY THE OPHTHALMOSCOPE.

DR. J. STILLING contributes an article on this subject in which he gives rules for estimating approximately all varieties and degrees of refraction by the aid of the images obtained with the reflector, only, at different distances, or when a ten-inch convex glass has been placed before the patient's eye. He thus obviates the necessity of using many glasses. ("Zehend. Klin. Monat.," xiii, Mai, Juni, p. 143—183.)

THE RELATION OF THE SURFACE OF THE RETINA TO THE DIOPTRIC SYSTEM OF THE HUMAN EYE.

DR. STANMESHAUS finds that the peripheral portion of the retina in emmetropic eyes (central vision) appears hypermetropic; in myopia the difference is very great; in hypermetropia, slighter. —("Graefe's Archiv.," Bd. xx, Abth. ii, p. 147—170.)

INJECTION OF CHLORAL INTO THE VEINS AS AN ANÆSTHETIC AGENT.

DR. WARLOMONT writes an article on this subject in the "*Annales d'Oculistique*," Sept., Oct., 1874. He discusses the history and quotes cases recorded. Ten grammes (154 grs.) in 30 grammes (about an ounce) of water is the usual quantity in an adult (12 or 15 grammes 184—231 grs.) may be given. Dr. Jos. Casse's instrument for transfusion of blood is figured and recommended for use. Chloral may be useful where inhalation of ether, &c., may not be applicable on account of the patient, or the operation having to be performed on the nose, mouth, &c., or where it is necessary for the patient to remain perfectly quiet for some time afterwards. In the *Annales* for Mars, Avril, 1875, p. 190—192, a case of death after the injection of chloral is noted from the records of the Académie de Méd. de Belgique, Séance du 24 Avril, 1875. The patient was a woman, aged 45, and the operation, extraction of cataract. It was considered that the chloral could not really be blamed for the result.

WOUND OF THE EYE BY A SHOT.

DR. FÜCKEL records a case in which a shot entered the eye to the inner side of the cornea, was supposed to have passed through the eye and made its exit to the outer side of the disc. At first, no ophthalmoscopic examination could be made and the patient could not see, then on the third day the media were quite clear, and a rent in the choroid could be made out to the outer side and above the disc. There were also two extravasations. A representation is given. On the twelfth day the vitreous became opaque. The patient was then lost sight of.—("*Zehend. Klin. Monat.*," April, Mai, xii, p. 161.)

EXTIRPATION OF BOTH LACRYMAL GLANDS FOR SARCOMATOUS DEGENERATION.

DR. ALEXANDER records the case and alludes to others published. The patient was a man aged 72.—("*Zehend. Klin. Monat.*," xii, April, Mai, p. 164.)

HYPERTROPHY OF THE LACRYMAL GLAND.

DR. SAVARY records a case in a man aged 59. The tumour was removed with great difficulty by a prolonged operation, which is described in detail. The patient recovered well.—("*Annales d'Oculistique*," Mars, Avril, 1874, p. 130.)

FOREIGN BODY IN THE ORBIT OF A CHILD.

DR. HALTENHOF records a case in which a piece of wood remained

in the orbit of a child for a year, and was then let out on making an incision to give exit to pus.—(“Bull. de la Soc. Méd. de la Suisse romande,” Oct., 1873, and “Annales d’Oculistique,” Mars, Avril, 1874, p. 180.)

OPERATION FOR CONICAL CORNEA.

DR. WECKER prefers Graefe’s operation with modifications. He removes a small flap of cornea from the apex of the cone with a Graefe’s knife, taking care not to penetrate the anterior chamber. The second day after this operation a stick of (mitigated) nitrate of silver is applied to the wound, only, and any superfluous silver is removed. This cauterisation is repeated for a fortnight, and then the ulcer is slit up with a Graefe’s knife, as in Sämisch’s operation for spreading ulcer of the cornea, and the slit is kept open for another fortnight. Atropine is used throughout the whole treatment, which extends over a month. At the end of that time, the ulcer may be allowed to cicatrise. If the opacity does not clear up after a time, the cornea may be tattooed. Dr. Wecker thinks this treatment might be simplified by omitting the preliminary cutting of a corneal flap, as the ulcer might be produced by cauterisation. He has not followed out this suggestion however. A case in which the operation above described was carried out successfully is detailed.—(“Annales d’Oculistique,” Mars, Avril, 1874, p. 121). In the number for Mars, Avril, 1875, a note of the condition of this patient after a considerable interval is recorded and another case noted.

KERATITIS VESICULOSA WITH SECONDARY GLAUCOMA.

DR. J. R. POOLEY (“Arch. of Ophth. and Otol.,” vol. iv, No. 1) records a case and alludes to two others on record. (See this Journal, vol. vii, p. 65, for Graefe’s case, the other one is recorded by Sämisch.)

THE ACTION OF HYOSCYAMINE ON THE EYE.

IN the “Arch. of Ophth. and Otol.,” vol. iv, No. 2, is a paper by Rosa Simonowitch, M.D., detailing some experiments made on the action of hyoscyamine on the eye. They were carried out under the superintendence of Prof. Dor, who appends some remarks. The results obtained were interfered with by the difficulty in obtaining hyoscyamine. There is a substance in the extract of hyoscyamine which has a strong mydriatic action, but the article commonly sold as pure hyoscyamine is without any mydriatic action. If these preparations really are hyoscyamine, the latter has no mydriatic action, and the mydriatic must be sought in the residue; or the real hyoscyamine is in the residue.

POSTURES SYMPTOMATIC OF PARALYSIS OF THE OCULAR MUSCLES.

M. GIRAUD-TEULON points out the important aids to diagnosis in cases of paralysis of the ocular muscles by noting the position in which the patient holds his head, &c. When an ocular muscle is paralysed, the least attempt to look at an object in the direction in which this muscle would act excites diplopia. The patient endeavours to avoid this by putting his head and eyes in such a position that he can see objects without using the affected muscle. If the movement of the left eye to the right be impaired, the patient turns his face to the right. He tries to supply the place of the left internal rectus by complementary movements of the muscles of the neck. The explanation of the position of the head when movements in a vertical direction are impaired is more complicated, and still more so in reference to oblique movements. The latter will not be considered. It will be sufficient to deal with the cardinal movements. When we look straight upwards or downwards with both eyes, the vertical meridians of the two eyes are kept vertical to each other by the simultaneous action of one rectus (superior in looking up, or inferior in looking down) associated with one of the obliques (the *inferior* in looking up and the *superior* in looking down). For the action of each of these muscles, representing a force applied to a bent lever, may be regarded as the resultant of three movements, vertical, horizontal (lateral and oblique) inducing a rotation or inclination of the principal meridians of the eye. Inability to look upwards causes double images; of unequal height (vertical), separated laterally (horizontal) and placed obliquely to one another (rotation). The attitude assumed by the patient is characteristic of this diplopia. (1) The face is raised, the orbital planes are not horizontal, to compensate for the inability to move one eye upwards. (2) The direction of the axes of the eyeballs do not correspond with those of the orbits; the one eye is adducted, the other abducted to compensate for deficient lateral movement of one eye. (3) The face is not merely raised, but the head is inclined to one shoulder to compensate for the deficient power of moving the eye obliquely. Besides this, however, the face is turned to *one side*. The other movements noted would give single vision in one direction only; to the extreme right or left of the field. The patient is in the position in which he would be placed by a complete paralysis of one or other lateral muscle. The face is turned in the opposite direction to the line of vision. Graefe also noted a peculiar rigidity in the aspect of the patient which is easily explained.

In simple cases, therefore, the attitude of the patient affords a clue to the kind of paralysis. It is necessary to ascertain in the first place which eye is affected. This is done (in the absence of testing by coloured glass) by getting the patient to cover

first one eye and then the other. When the eye on the paralysed side, alone, is uncovered, vertigo, or inability to walk straight will be evident. Say that we find the left eye is paralysed and that the head is thrown back, we conclude that the patient cannot move the left eye upwards. Secondly, we ascertain that the left (paralysed) eye is *adducted*. This shows that the muscle affected is an adductor as well as an elevator; because the adduction is complementary of a deficiency. The superior rectus, alone, of the two elevators, has also adducting power. So that it is the left superior rectus which is paralysed (and supplemented). Instead of looking at the position of the eyes we may consider that of the head. We may often observe that the head is inclined; the right ear being depressed towards the shoulder of the same side. This is done to carry the vertical meridian of the left eye in the same direction, that is, the summit of the meridian to the right or inwards. The superior rectus is the only elevator muscle which produces this rotation. After the paralysis has existed some time, the position of the head is no longer characteristic, and before coming to any diagnosis from position alone the duration of the affection must be ascertained.—(*Annales d'Oculistique*," Juillet, Août, 1874.)

ACTION OF STRYCHNIA ON THE EYE.

A DETAILED abstract of a memoir on the action of strychnia on the eye in health and disease, by Dr. Von Hippel, is given in the "*Annales d'Oculistique*," Mars, Avril, 1874, p. 186—194.

THE LYMPHATIC SPACES IN CONNECTION WITH THE EYE.

A SUMMARY of the recent literature of the subject, and a list of papers, is given in the "*Annales d'Oculistique*," Mars, Avril, 1874, p. 208—12.

ENTROPION.

DR. WARLOMONT describes and figures a new operation for entropion and a new spatula ("*Blepharospathe-éventail*") in the "*Annales d'Oculistique*," Mai, Juin, 1874.

ADVANCEMENT OF THE INTERNAL RECTUS DIVIDED IN AN ACCIDENT.

DR. WECKER narrates a case in which a man received a blow on the eye which divided the internal rectus. An external strabismus resulted. Owing to the density of the cicatricial tissue, there was some difficulty in exposing the divided muscle. He then passed a double thread through it, according to the plan described in last Periscope (see p. 123). Instead of tying the corresponding threads, however, he joined the lower thread to

the one passed through the conjunctiva at the upper border of the cornea, and *vice versâ* with the other. By this means one knot is tied without causing any traction or pain, and it is only when the second is tied that the muscle is pulled forwards. There is, therefore, less risk of pulling the muscle a little upwards or downwards instead of straightforwards. When the suture has to be removed it is only necessary to divide the thread in one place, and then the whole suture can be drawn away. ("Annales d'Oculistique," Mai, Juin, 1874, p. 229.) In the number for Mars, Avril, 1875, p. 122, Dr. Masselon describes and figures a double hook which Dr. Wecker has devised for the purpose of holding the muscle at the time of passing the suture through it. The hook is constructed on the principle of a lithotrite. It is used in the same manner as an ordinary strabismus hook, but care is taken to get the whole of the muscle on it. Then the conjunctiva is held out of the way with forceps, and the second portion of the hook is pushed down, grasping the muscle between it and the first branch, just as a stone is held between the two blades of the lithotrite. The second branch has little projections fitting into perforations of the other one.

TENOTOMY OF THE SUPERIOR AND INFERIOR RECTI.

DR. H KNAPP records three cases in detail, to which we can only refer. In the first case, the superior and inferior recti of the same eye were divided, at different times, for paresis of the superior rectus. The result was good. In the second case, the external rectus in each eye, and the inferior rectus of the left, were divided for strabismus and diplopia. In the third, the superior rectus was divided, and then a suture was applied. A cure resulted after advancement of the inferior rectus. There was not only paralysis of the main depressor oculi, but increased contraction of the superior rectus and inferior oblique. ("Archives of Ophth. and Otol.," vol. iv, No. 1.)

NYSTAGMUS, INTERMITTENT, IN A MINER.

DR. LÉON NOEL records the case of a miner, aged 22, who was subject to lateral oscillation of the eyes when he looked up as high as possible. He also had rotatory nystagmus in certain positions, and clonic spasm of the upper eyelids and upper extremities. ("Annales d'Oculistique," Nov., Dec., 1874, p. 211.)

DIPLOPIA—STRABOTOMY—CURE.

THE patient was a woman aged 52, under the care of Dr.

Savary. The diplopia followed a blow over the eyes four months previously. There was convergent strabismus. There was no anomaly of refraction, and no cause for the diplopia could be assigned. The symptoms were quite relieved by division of the internal recti, an interval of twenty-four hours intervening between the two operations. ("Annales d'Oculistique," Nov., Dec., 1874, p. 212.)

OPHTHALMOSCOPIC PHENOMENA OF THE SIGNS OF DEATH.

DR. GAYAT gives a summary of a work of his in the "Annales d'Oculistique," Jan., Feb., 1875. He lays most stress on the disappearance of the central vessels where they cross the disc; disappearance of the column of blood in the arteries at various parts of the fundus; infiltration of the retina, and the appearance of a small red spot in the situation of the macula lutea.

BROMIDE OF POTASSIUM IN ALCOHOLIC AMBLYOPIA.

AN abstract of a paper by Dr. Quaglino ("Annali di Ottalmologia,") is given in the "Annales d'Oculistique," Jan., Feb., 1875, p. 26. He has found bromide of potassium very efficacious.

CARTILAGINOUS TUMOUR OF THE BASE OF THE SKULL.

DR LÉON NOEL records the case of a man, aged 20. A fortnight previously he awoke one morning unable to see at all with one eye and but imperfectly with the other. He had had pain in his head and vertigo for some time. He also complained of pain in the eye in which he still had sight, and heard a noise on the same side of his head. No clue whatever could be obtained as to the origin of these symptoms. The right eye was prominent, the lids and conjunctiva swollen. The disc and surrounding parts showed evidences of neuro-retinitis, and the veins were much dilated. On the left side the symptoms of venous obstruction were less marked. The disc was in a state of advanced atrophy. A bruit was heard by the patient on the right side synchronous with the pulse, but no bruit could be heard with the stethoscope. His sense of smell was lost. He could still taste. He had no loss of sensation or of motion. The diagnosis made was that of a tumour about the body of the sphenoid, more especially affecting the right side, pressing on the right carotid, and giving rise to the bruit heard by the patient. As the case progressed, the vision in the right eye failed more and more, the exophthalmus on both sides became more marked, and a hard tumour could be felt inside the right orbit, and then

within the left; a tumour was noticed pressing down the soft palate. The history extends over thirteen months. At the post mortem, an immense cartilaginous tumour, growing from the base of the skull, was found. It varied greatly in consistence, and was composed of hyaline cartilage, undergoing colloid or mucous degeneration in places. The case is interesting as showing how far ocular symptoms throw light on affections of the base of the skull, and to what an extraordinary degree of compression the brain may be subjected if the pressure be gradual. The patient retained consciousness, sensibility, and power of motion till nearly the last. (*"Annales d'Oculistique,"* Nov., Dec., 1874, p. 201.)

CYSTICERCUS CELLULOSE BENEATH THE OCULAR CONJUNCTIVA.

IN *"Zehend. Klin. Monat.,"* xiii, Jan., Feb., März, p. 77, is an account of a case by Hock (Vienna.) The patient was a child, aged 8.

CYSTICERCUS IN CONNECTION WITH THE EYE.

POUCET (*"Gaz. Méd. de Paris,"* 1874, No. 10,) records a case in which a cysticercus developed between the choroid and the retina. He gives a list of cases of cysticercus in the eye, &c., which have been recorded. In three cases, the eyelids were affected; in ten, the cellular tissue of the orbit; in nine, the anterior chamber; in thirteen, the conjunctiva and the cornea; in nineteen, the vitreous: total, fifty-four cases. (*"Annales d'Oculistique,"* Mars, Avril, 1874, p. 182.)

A PECULIAR AFFECTION OF THE OCULAR CONJUNCTIVA.

CAMUSET (*"Gaz. des Hôp.,"* 1874, No. 39,) records the case of a lad aged 16. On opening the eyes, the conjunctiva presented a very unusual appearance, and scarcely any cornea was visible. The globe was covered by a membrane of a yellowish-white colour, and crossed by a few vessels. It covered the cornea as far as the pupil, which it limited irregularly. The affection was said to have begun when the child was five years old. Treatment was not of any avail. The growth was considered to depend on hypertrophy of the epithelial layer of the conjunctiva, and *"leucophthalmos epithelial,"* proposed for its designation. (*"Annales d'Oculistique,"* Mars, Avril, 1874, p. 183.)

CONJUNCTIVITIS DIPHTHERITICA.

UNDER this title, Dr. J. Hirschberg records the case of a lady, aged 20, who came under his care with very severe conjunc-

tivitis, attended by great chemosis, sero-mucous discharge, and swelling of lids. One eye only was affected. There is no mention of any membranous formation. It was suspected that the disease might be due to infection from leucorrhœa, from which the mother was then suffering. As it is a well-known fact that non-specific matter brought in contact with the conjunctiva is able to produce a severe inflammation even of a diphtheritic character, it was thought possible that the young lady might have contracted her eye disease while superintending the family washing, which she had done a short time previously. The unaffected eye was covered up. Compresses of iced water and leeches were used for the other eye. As the cornea was threatened, the patient was rapidly mercurialised. On the ninth day, nitrate of silver was used with manifest advantage, but was left off on account of the cornea, on which a deep spreading ulcer had formed. It was determined to form a fistula through the ulcer, and for this purpose an emetic was given to rupture the cornea. It had the desired effect. The cornea was afterwards cauterised. An adherent leucoma resulted, and in consequence of this, secondary glaucoma developed, rendering iridectomy necessary. Finally the patient could read No. iv Sn., and count fingers at 9'. In reference to the development of glaucoma, in consequence of adherent leucoma, a case is mentioned in which a deep glaucomatous cup rapidly developed in a young woman from this cause. ("Archives of Ophthal. and Otol.," vol. iv, No. 2.)

GRANULAR AND CONTAGIOUS OPHTHALMIA.

MR. NETTLESHIP thinks there are some points in relation to the diseases commonly known as contagious ophthalmia about which there is still a certain amount of misapprehension. The importance of the subject is apt to be overrated by some and underrated by others according to the sense in which the word is used, and the view taken as to the probability of bad results occurring in mild cases. The degree of contagiousness, the amount and kind of injury caused by the ophthalmia in large schools, &c., at the present day, and some points in the details of treatment and prevention, form the subjects to which most attention is directed, the writer having lately had special opportunities for studying the malady on a large scale in connexion with the Anerley (Poor-law) School. The two main elements of the mixed condition known as ophthalmia in such establishments, are treated separately at considerable length, viz.: granular disease of the conjunctiva, or trachoma, and the various forms of conjunctivitis. The chief stages of the *granular disease* are described, and scarring of the conjunctiva is stated to be the natural result of spontaneous cure in severe

cases. Symptoms are often almost absent even in tolerably bad cases; there is no fixed relation between the degree of change in the lids and the subjective symptoms in different cases, though this relation is as a rule constant in each patient. The author thinks that permanent inconvenience or damage to sight from the results of the disease (corneal opacities, entropion, &c.,) occur less often than would be supposed if our attention were confined to the worst cases, such as apply at the ophthalmic hospitals; and a table of 21 cases is given in support of this view. The prognosis in granular disease is difficult if we see the patient only once; attention is directed to the main points by which we should be guided in making it. In discussing the causes of the granular disease the writer goes in some detail into its history, especially in respect to its alleged introduction into Europe from Egypt; he considers that it existed in Europe long before the Egyptian campaign, and that it is not either infectious or contagious. A *résumé* of several different views on this subject is given, and the author comes to the same conclusion as already arrived at by Welch, in thinking that the disease is caused by prolonged exposure to the action of warm, moist air, made impure by animal matter (not organised particles), and he regards it as impossible to prevent mild degrees of the disease from being common in crowded, damp countries. The results of some inspections of children in various parts of the country are given in this connexion. The disease is slowly produced and varies in degree, *cet. par.*, with the length of exposure to its causes; in time it becomes partly hereditary, as is seen in the Irish and some other races. Under *contagious ophthalmia* are included all forms of conjunctivitis, producing muco-purulent or purulent discharge, attention being drawn to some of the chief varieties, and to the vagueness with which the term "catarrhal ophthalmia" is often used. Some account is next given of the chief varieties of mixed ophthalmic disease, which the author found it convenient to distinguish in practice among the cases (about 400) of which he had charge in connection with the Anerley School, six groups being distinguished.

In discussing the causes of the various forms and degrees of contagious ophthalmia, particular attention is called to the fact that every case of contagious ophthalmia is not the result of contagion; conjunctivitis of every possible degree may be produced by other causes than contagion; he disbelieves in the spread of purulent ophthalmia by aerial infection, except when many cases of the disease are crowded together; nor does he think it at all probable that clothes, &c., which hang in the wards act as air-filters arresting the contagious particles which, according to some authors, are abundantly given off from the inflamed conjunctiva into the air, and thus becoming potent sources of contagion. The disease cannot be compared in this respect

with ringworm, in which the contagium is dry and almost powdery. The writer has come to the conclusion, from observing the children under his own care, that, as a matter of fact, a good many cases of the mild muco-purulent ophthalmia of schools are not due to contagion, but to other causes, especially cold wind, dust, and measles, acting on children whose eyelids were predisposed to inflammation by a previously existing granular condition. Each of the chief causes of conjunctivitis is discussed in some detail. The severe ophthalmia which ravaged the British Army early in the century was probably due less to direct importation from Egypt than to the epidemic of influenza of 1803 acting on Irish soldiers with unhealthy lids, the army having been increased in size and the barrack system recently introduced.

Under the heading of local treatment we find remarks on the selection of cases requiring it, the effects to be expected, and the length of time that it must be kept up, together with a consideration of the relative usefulness of weak and strong remedies and of the best methods of application, stress being laid on the necessity of applying the remedy thoroughly to the oculo-palpebral fold of the upper lid, above the tarsus. Many careful trials were made with powdered acetate of lead, and the writer concludes that whilst it does no good, it is often injurious by rendering the granulations harder and thus setting up corneal ulceration, and he thinks that its use for this purpose should be given up. Some suggestions are given for the general management of schools, &c., in respect to the disease, and the practical points of the paper summed up in some short conclusions. A list of authors is given. ("Brit. and Foreign Med. Chir. Review," Oct., 1874, and Jan., 1875, pp. 74.)

OPHTHALMIA IN THE METROPOLITAN PAUPER SCHOOLS.

A REPORT on this subject, made by Mr. Nettleship in the autumn of 1874, to the Local Government Board, has been printed (pp. 118, with Appendix). It is based on an inspection of the eyes of every child in the 17 Metropolitan Pauper Schools, together with such facts in the construction, administration, degree of crowding, &c., in each school, as time allowed him to collect. The total number of children inspected was 8,798, of whom 20 *per cent.* were found to have healthy, or practically healthy, eyelids; 35 *per cent.* eyes predisposed to ophthalmia by the existence of more or less granular lids; 15 *per cent.* with active ophthalmia of some kind or degree; and 30 *per cent.* with bad granular lids, but without present symptoms. 9 *per cent.* of all the children showed some damage to one or both corneæ, estimated as directly or indirectly due to ophthalmia; many of these were however extremely slight.

The subject is treated from the practical and administrative aspects mainly, for the purpose of ascertaining—1st. The actual state of the schools separately and *en masse* in respect to the varieties of affection which are commonly grouped together as “ophthalmia;” 2nd. The relation borne by the “ophthalmic state” of the children to the conditions of their life in the schools, to age and sex, and to conditions independent of school-life, respectively; 3rd. How best to remedy the present state of things; for although there is less ophthalmia in these schools than there used to be, their condition as to this disease is still admitted to be very unsatisfactory. The last statement is abundantly supported by details of various kinds, and by the fact that nearly two-thirds of the 945 children who were on the sick lists when the inspection was made were under care for ophthalmia; while for reasons which are explained this proportion does not represent all, or nearly all, who ought to be isolated and under treatment.

The importance of local epidemics of measles in originating severe outbreaks of ophthalmia is well illustrated by the schools at Sutton, Hanwell and Leytonstone, and the facts recorded in this connexion confirm the opinion expressed on the same subject at p. 56 of the article in the “Med. Chir. Review.” The method of inspection and some other technical details, together with various tabulated statements, &c., are placed in an Appendix. This Report probably contains the most complete and uniform information on the state of these schools, in respect to ophthalmia, that has yet been collected.

TRANSPLANTATION IN SYMBLEPHARON, &c.

DR. WECKER describes his plan of performing conjunctival transplantation from the rabbit in cases of symblepharon, &c. He objects to Dr. Wolff's process.—(“Annales d'Oculistique,” Mars, Avril, 1874, p. 127. In the number for Nov., Dec., p. 219, is a translation of an article by Prof. Otto Becker on the same subject. In the number for Jan., Fev., 1875, p. 28, is an article by Prof. Raymond.—(“Annali di Ottalmologia.”) In the number for Mars, Avril, 1875, are some remarks on Dr. Wecker's latest experience in dermic grafting and transplantation from the rabbit. In “Zehend. Klin. Monat.,” xiii, Jan., Feb., März, p. 75, is an abstract of a paper by Otto Becker, in which he narrates two cases of transplantation of conjunctiva from the rabbit.

BLEPHAROPLASTY.

DR. JUL. V. SIKLÓSY details successful cases of blepharoplastic

operations, and gives illustrations.—(*"Zehend. Klin. Monat.,"* xii, Juni, Juli, p. 228.)

FOREIGN BODY IN THE ANTERIOR CHAMBER FOR FIVE YEARS.—NO
SYMPATHETIC MISCHIEF.

DR. SAVARY records the case of a woman, aged 58, who came under care for pain, &c., in the left eye. Five years previously the eye had been struck by a piece of stone; great pain followed, but this passed away after a time, till shortly before she came under care. A whitish mass could be seen in the anterior chamber, and was suspected to be a foreign body covered with lymph. The sight was lost. The foreign body was removed with some trouble, and a piece of iris snipped off. The pain was quite relieved.—(*"Annales d'Oculistique,"* Juillet, Août, 1874, p. 17.)

SUB-CONJUNCTIVAL DISLOCATION OF THE LENS.

DR. ANDRÉ records the case of a woman, aged 67, who came under his care. He found the right lens dislocated upwards beneath the conjunctiva. The pupil was of the shape of a battledore. The patient had received no injury. Ophthalmoscopic examination showed a glaucomatous cupping of the disc. The patient had not felt any particular pain, and the date of the displacement was not known. In the other eye there was a large prolapse of the iris upwards, and the lens was partially displaced and opaque. The displacement in each was considered to depend on glaucomatous tension. When seen, the tension of the globes was normal.—(*"Annales d'Oculistique,"* Sep., Oct., 1874, p. 111.)

SPONTANEOUS SUB-CONJUNCTIVAL DISLOCATION OF THE LENS.

DR. W. ZEHENDER (*"Klin. Monat.,"* xiii, Jan., Feb., März, p. 84) narrates a case in which the left lens was displaced beneath the conjunctiva between the superior and inferior recti muscles. The patient, aged 58, did not know of any accident, nor when the displacement occurred. The conjunctiva was incised and the lens removed. No ill result followed.

PARTIAL SUB-CONJUNCTIVAL DISLOCATION OF THE LENS.

DR. J. LEDERLÉ records the case of a man, aged 55, who received a blow on the eye a month before he came under care. The lens of the injured eye was found to be partially displaced upwards and outwards under the conjunctiva. Vision only amounted to quantitative perception of light. The lens was removed through the conjunctiva, as there were symptoms of irritation. The

latter subsided, but no improvement resulted as regards the sight.—("Zehend. Klin. Monat.," xiii, Jan., Feb., März, p. 30.)

SPONTANEOUS DISLOCATION OF THE LENS AND ITS CONSEQUENCES.

DR. FRITZ RAAB quotes the literature of the subject; sums up to the effect that the greatest number of cases are congenital; some depend on chronic choroidal inflammation; some on senile processes in the lenticular system; and others on various processes, such as buphthalmos, staphyloma, &c. He narrates a case of dislocation of the lenses in which glaucomatous symptoms came on in one eye. The lens in this eye was dislocated into the anterior chamber. It was transparent. It was removed, but no useful vision was regained. The dislocation in the other eye was upwards and inwards. A detailed description is given of the naked eye and microscopic appearances of an eyeball (sent to him), showing *the lens displaced forwards and adherent to the cornea*. A representation of a section of the hardened eyeball is given. (Graefe's "Archiv.," Bd. xxi, Abth. i, pp. 190—222.

NEW OPERATION FOR CATARACT.—EXTRACTION BY PERIPHERAL FLAP.

DR. WECKER describes a new method of extraction of cataract. An operation for extraction of cataract should fulfil the following conditions:—1. The section should be in the part best adapted for coaptation and cicatrisation; therefore, at the sclero-corneal junction. 2. It should allow of easy removal of the lens without having recourse to enlargement of the pupil. 3. Strangulation and prolapse of iris to which peripheral sections predispose ought to be avoided as much as possible. 4. Advantages to a few cases should not be attained at the price of disadvantage of a considerable number. The operation he proposes is performed thus:—1st step. An assistant raises the upper eyelid with his finger, or a small speculum with which he holds the eyelids away from the globe. The operator having fixed the eye with forceps near the middle of the inner border of the cornea, detaches very exactly the upper third of the cornea at its junction with the sclerotic. (If the cornea has a diameter of 12 mm. (.48"), a flap is formed 4 mm. (.16") in height, and 11.32 mm. (.4528") across at the base.) When the counter puncture is made, and the iris does not lie over the edge of the knife, the operator lays aside the fixation forceps and finishes the section without forming any conjunctival flap. When the section is finished, the upper lids are shut and the speculum withdrawn. (The knife which he uses and figures is half the width of the old cataract knife, and double that used for the linear operation.) 2nd step. The eye is covered with a cold sponge, and the patient remains quiet. Then the capsule is

opened with an ordinary cystitome, whilst the operator raises the upper lid. 3rd step. An assistant takes charge of the upper eyelid, and the operator, whilst pressing the lens (through the lower eyelid) towards the opening made, depresses the *peripheral insertion of the iris* by means of a fine caoutchouc spatula (figured), so as to free the lens from the iris, which tends to envelop it at the moment of exit. 4th step. The pupil is freed from cortical substance, &c., by pressure from below upwards exercised outside the lower lid. During this process of cleaning the pupil little attention is paid to the iris; but, when the pupil is clear, if the iris has not spontaneously assumed its natural position, the prolapse must be reduced by passing the little spatula between the edges of the wound, and pressing the iris before it. 5th step. The iris being thoroughly in place, two or three drops of a solution of neutral sulphate of éserine ($\frac{1}{2}$ p. c. solution) are instilled, and the operator waits for five minutes till the myotic has acted, the pupil contracted, and the iris has no longer any tendency to prolapse. The patient is then told to look down. (The neutral sulphate of éserine does not cause any irritation. It should be a freshly-prepared solution.) The bandage is then applied. It is prudent to remove the bandage one or two hours after the operation, and instil some more éserine, if the former application does not seem to have taken sufficient effect. Considerable contraction of the pupil is produced, which lasts more than twenty-four hours, during which time the wound will have united, and recourse can then be had, if necessary, to mydriatics without any danger of prolapse of iris.—(*Annales d'Oculistique*," Mai, Juin, 1875, p. 264.)

Extraction of Cataract.—A translation of Jaeger's pamphlet, with illustrations, on his new method of extracting cataract by "a concave section," is given in the "*Annales d'Oculistique*," Jan., Fev., 1874, p. 56.

Extraction of Cataract.—Dr. Classen passes in review the different methods now in use for extraction of cataract, and sums up in favour of Weber's operation.—(*Graefe's "Archiv."* Bd. xx, 2 Abth., p. 123.)

Extraction of Cataract.—Dr. Masselon notes two modifications introduced by Dr. Wecker into his method of performing Graefe's operation. The iris is divided by the scissors which he uses for iridotomy, without drawing it out through the wound, as is ordinarily done. The iris by this plan does not get entangled in the edges of the wound. During the manipulation of the lens, the lids are held away from the eye, and the patient is thus prevented exercising any pressure on the globe, by an assistant, by means of the speculum. This should be small, and placed over the nose. (A figure is given.) The loss of vitreous has been much less since the adoption of this manœuvre. (*Annales d'Oculistique*," Mars, Avril, 1874, p. 113.)

SHORT REPORT ON TWO HUNDRED SCLEROTIC EXTRACTIONS (CATARACT).

DR. Schiess-Gemuseus. He has already reported a previous hundred cases.—("Graefe's Archiv.," Bd. xxi, Abth. i, p. 47.)

AN UNUSUAL CASE OF LAMELLAR CATARACT.

DR. H. BRESGEN notes a case of lamellar cataract, in a man 40 years of age, in which the anterior part of the lens was transparent as well as the nucleus, but around the latter was a circular bluish-white layer, and in the posterior part of the lens, two shell-like zonular opaque portions symmetrically placed in reference to the posterior half of the perinuclear layer, but each opacity was separated from the rest by clear lens substance.—("Zehend. Klin. Monat.," xii, Juni, Juli, p. 263.)

THE NOURISHMENT OF THE LENS.

DR. ZEHENDER communicates to his journal (April, Mai, xiii, p. 152), an account of Dr. Bence Jones's experiments on the absorption of lithium carbonate by the lens. A solution of the salt was given to the patient a certain time before extraction of cataract was performed, and the latter afterwards tested. Lithium was found in all parts of the cataract, when the salt was given three-and-a-half hours before the operation. The lens, owing to its isolated position, is the last part of the body to receive any substance introduced into the blood.

CONGENITAL SYMMETRICAL DEFECT OF BOTH LENSES.

DR. H. BRESGEN records the case of a lad aged 15. There was myopia $\frac{1}{6}$ in each eye. $V. = \frac{2}{9}$. With a widely dilated pupil there was seen a symmetrical defect in the inferior part of each lens. The defect was limited by a dark curved line, the convexity of which was upwards. The whole thickness of the lens was involved. Otherwise the lenses were normal in situation and continuity. The iris was not at all tremulous. The entire pupil appeared red by transmitted light, but interrupted by a dark curved line. ("Archives of Ophth. and Otol.," vol. iv, No. 2.) See also Hirschberg, further, on Coloboma.

SEROUS CYSTS OF THE IRIS.

DR. FR. HOSCH gives an account of a case with a careful microscopic examination, and an illustration. The cyst was in the iris, and had followed an injury.—("Zehend. Klin. Monat.," xii, April, Mai, p. 119—27.)

At pp. 128—151 of the same number, Dr. Hubert Sattler treats of the same subject, and narrates three cases which were

under the care of Prof. Arlt. In each there had been a slight wound; there was a scar at the sclero-corneal junction, the cystic formation occurred long after the injury, and, in each, symptoms of irritation came on in consequence of increase in size in the cyst. The operative treatment, in the first case, consisted of an incision at the sclero-corneal junction opening the cyst, the wall of which was then drawn out with forceps and cut off with scissors. A good deal of inflammation followed, and two iridectomies were necessary. The cyst did not recur. In the second and third cases, incision in the sclero-corneal junction, withdrawal of the cyst, and snipping it off, succeeded well. The author treats at length of the nature and origin of the cysts. He sums up to the effect that the following points are of special importance:—(1) The previous occurrence of a wound of the eye which may be of a very trifling character. (2) The peripheral position of the (often) inconspicuous scar. (3) The well-established fact that portions of tissue may be carried in from the front to the iris by the penetrating foreign body. Eyelashes, for instance, have been carried in. He thinks the iris-cysts would most properly come under the class of cystic tumours, known as exudation-cysts. As to treatment, he thinks Prof. Arlt's plan satisfactory; no coloboma is left, and the scar is not increased. It is quite sufficient to remove the anterior and lateral portions of the cyst.

SYPHILITIC IRITIS.

DR. DROGNAT-LANDRÉ reports the statistics of a number of cases of syphilitic iritis, in the "*Annales d'Oculistique*," Mai, Juin, 1875, p. 250—264.

CONGENITAL ABSENCE OF IRIS—INHERITED.

MANZ, of Freiburg, records the case of a boy, aged 6, who had no iris in either eye. The right was affected with symptoms of cyclitis, &c., and cataract. An attempt to remove the cataract led to loss of vitreous and shrinking of the globe. Manz had operated on the father for cataract. He also had no iris in either eye, and the operation failed. The cases support previous experience in leading operators to be cautious in dealing with eyes affected with congenital malformations.—("*Zehend. Klin. Monat.*," xiii, Jan., Feb., März, p. 35.)

IRIDOTOMY.

DR. L. GROSSMANN carried out the principle of Wecker's operation successfully, in one case, with a small lance-shaped knife and a pair of fine, straight scissors. He afterwards obtained Wecker's instruments, and operated successfully in a second

case. In a third case he was disappointed, owing to the leather-like condition of the false membrane present. In a fourth, he was again successful.—("Zehend. Klin. Monat.," xiii, April, p. 101—8.)

In the "Annales" for Mars, Avril, 1875, Dr. Masselon records a case of *congenital dislocation of the lenses*, in which iridotomy was successfully performed by Dr. Wecker. A figure, showing the result, is given. When looking through the lens, the patient was myopic $\frac{7}{2}$, and the acuity of vision was only $\frac{1}{7}$ with $-3\frac{1}{2}$; when looking by the side of the lens, the patient was hypermetropic $\frac{11}{4}$, and the acuity of vision was $\frac{1}{2}$ with $+2\frac{3}{4}$.

Dr. Wecker, during 1873, performed 39 iridotomies, 22 of them being in cases of secondary capsular cataract with obliteration of pupil, and 17 "simple," that is, mere incision of iris. (See last Periscope, p. 122). Iridotomy may replace iridectomy where it is necessary, at the same time, to perform needle operations on the lens. A case is narrated. The case is also narrated of an old woman who had been operated on for glaucoma (iridectomy followed by extraction of cataract). The pupil had closed. Iridotomy was performed with an excellent result. (A figure is given).—"Annales d'Oculistique," Mars, Avril, 1874, p. 115, &c.)

Krüger, having found Wecker's plan inefficient in cases where the membrane is very dense and the iris will not retract, has had an instrument constructed which consists of two small sharp spoons, which are made to meet and cut out a piece of the membrane. The piece is brought away when the instrument is withdrawn. The action of the instrument, therefore, somewhat resembles that of the punch used by railway-guards to mark the tickets.—("Zehend. Klin. Monat.," Oct., Nov., Dec., 1874, p. 429.)

MYOSIS CAUSED BY PARALYSIS OF THE LEFT CERVICAL SYMPATHETIC
IN CONSEQUENCE OF A GUN-SHOT WOUND.

THE symptoms did not come on for more than two years after the injury, and began as neuralgia of the arm, on the injured side. The left pupil was very small and immoveable. $V. = \frac{2}{200}$; with $-18 = \frac{2}{200}$. At three inches he could read the smallest print. Atropine dilated the pupil. The treatment consisted in the instillation of atropine, rubbing in mercurial ointment to the scar, and the application of leeches. Some relief was experienced.—("Archives of Ophth. and Otol.," vol. iv, No. 2.)

A SMALL PIECE OF STEEL PENETRATING THROUGH THE CORNEA AND
PUPIL INTO THE LENS SUCCESSFULLY REMOVED BY THE EXTRACTION OF THE CATARACTOUS LENS FIVE MONTHS LATER.

DR. BARKAN records the case.—("Archives of Ophth. and Otol.," vol. iv, No. 2.)

EPITHELIAL CANCER OF THE CONJUNCTIVA.

THE patient, a man aged 70, was under the care of Dr. Chapman. Dr. H. Knapp gives the details of the microscopic examination. The growth originated from injury; was an instance of primary epithelial cancer of the conjunctiva which is rare; the extension of the neoplasm, by uninterrupted rows of epithelial cells, could be demonstrated in the cornea, and the young elementary parts in the corneal portion of the tumour had the characteristics of the original pseudoplasm.—("Archives of Ophth. and Otol.," vol. iv, No. 2.)

SYMPATHETIC OPHTHALMIA AFTER EXTRACTION OF CATARACT.

DR. KLEIN (of Vienna) brought two cases under the notice of the Ophthalmic Congress at Heidelberg, in 1874. He attributed the onset of the affection to prolapse and strangulation of the iris. During the discussion, fourteen other cases of sympathetic ophthalmia following operations were noted. Prof. v. Arlt mentioned a curious case. A man, æt. 40, had complete glaucoma of right eye, and it was commencing in the left. Iridectomy was done in the latter, but could not be done on the right. He had good sight for two or three years. The right eye became painful and enucleation was refused. Six or eight weeks later the left eye was attacked with sympathetic ophthalmia.—("Zehend. Klin. Monat.," xii, Oct., Nov., Dec., p. 334—344.)

SYMPATHETIC OPHTHALMIA THREE WEEKS AFTER A WOUND—FOREIGN BODY LODGED IN THE SCLEROTIC NEAR THE DISC—TURNING GRAY OF THE EYELASHES ON THE SAME SIDE.

DR. JOS. JACOBI records the case of a man, aged 29, whose eye was wounded on October 22nd, by a piece of metal. The next day, as the lens had become cataractous, it was removed with a free iridectomy. No foreign body was discovered. On October 27th, well-marked sympathetic ophthalmia was present in the other eye, so that it must have developed within twenty-five days. He had been recommended excision ten days or so before, but had simply been frightened away. Enucleation did not check the progress of the sympathetic ophthalmia. Some months later, the eyelashes on the eye sympathetically affected were noticed to have turned white (suddenly, as is supposed). Examination of the eyeball, removed, showed that a foreign body had traversed the eyeball, pierced the retina and choroid behind, and lodged in the sclerotic near the disc, which showed partial atrophy; there were no signs of neuritis.—("Zehend. Klin. Monat.," xii, April, Mai, p. 153—61.)

SYMPATHETIC OPHTHALMIA.

DR. SCHMIDT records two cases following injury. In the first, enucleation was practised twenty-four days after the accident, on account of pain. Four days later, symptoms of sympathetic iritis, &c., appeared in the other eye, and developed to a severe degree. Mercury was given internally; atropine used. At the end of six weeks from the onset of the sympathetic mischief, the patient was discharged, with *perfect vision*, and no synechiæ. A detailed microscopic examination was made, and is recorded. An eyelash had been seen in the anterior chamber before removal, and was now found to be imbedded in the lens. In the second case, the sympathetic mischief appeared in the form of circumscribed opacities in the vitreous, without a trace of iritis. Enucleation was not practised till after the sympathetic affection had become well established. After the use of atropine, rest, and leeches, the vitreous cleared, and *vision became* quite good.—(“Zehend. Klin. Monat.,” xii, April, Mai, p. 177.)

A CASE OF EMBOLISM OF THE ARTERIA CENTRALIS RETINÆ.

By Prof. HERM. SCHMIDT, of Marburg.

THE patient was a man, aged 58, who came under care on account of incomplete left hemiplegia. This was probably due to embolism, as a complicated affection of the heart was discovered. During the night between 23rd and 24th July (while in hospital), the left eye suddenly became blind. He was on the night-stool at the time. On examination the next morning, the eye was found to be quite blind. In the evening, the eye presented a normal appearance externally, and the media were quite transparent. The optic disc was fairly defined, and of a normal colour. The arteries on it seemed quite empty, and were scarcely distinguishable. They could, however, be followed for some little distance beyond the disc. On pressure, no pulsation could be excited. The veins were of a dark colour, and fair size. There was a remarkable absence of the fine curves usually met with. The column of blood was interrupted here and there. The region of the macula lutea and the part between it and the disc was of a slightly gray colour and opaque, and the yellow spot itself could not be distinguished (as is usually the case in the inverted image) as an (transversely) oval brownish-red spot, of a deeper colour than the rest of the fundus. At one part, corresponding to the lower border of the macula, was a broadish, dark red, horizontal line, about the length of a half diameter of the disc. The other eye was quite normal. On the following morning, there was slight chemosis, which increased greatly during the day; the globe became prominent and tense; the

eyelids, &c., somewhat œdematous; the iris slightly discoloured, the pupil scarcely dilating under the influence of atropine; the vitreous slightly hazy; the disc ill-defined, congested, hazy; the veins appearing as dark streaks, with interruptions here and there; the arteries exceedingly small, but possibly fuller than the day before. The retinal haze had increased, and the dark red spot in the neighbourhood of the macula lutea had disappeared. During the next few days, the appearances of retinitis increased, but there was no swelling of the disc, nor opacities in the vitreous. On the ninth day (August 1) the other symptoms seemed diminishing, but the vitreous had become very opaque; six days later there was still exophthalmos, moderate chemosis, and congestion of the conjunctiva; the pupil dilated but slightly. The vitreous was more transparent, and distinct opacities were perceptible. The situation of the optic disc could be made out by the convergence of the vessels, but its margins were lost in the surrounding retina. From that time the symptoms of iridochoroiditis gradually diminished. On November 26th, the eye externally appeared normal, except that the pupil was small and adherent. Ophthalmoscopically, the vitreous had recovered its transparency, the retina and disc showed signs of advanced atrophy. There were a few apoplexies and pigment spots. There was no quantitative perception of light. The patient died on May 27th, 1872. There was the remains of an embolic patch in the right hemisphere. The left optic nerve seemed rather thinner than the right; there were changes in the medulla, and the heart was diseased. The left globe, nerve, ophthalmic artery, &c., were removed and hardened. The ophthalmic artery and its chief branches were empty, save here and there a little blood-clot. At the seat of origin of the central artery was some blood-clot, and some of the smaller vessels arising near here were completely plugged. The canal of the arteria centralis was patent as far as the optic nerve sheath, but there were a few blood corpuscles attached to the wall here and there. It passed through the sheath at a distance of ten mm. (.4") from the globe. Nearer the globe the nerve fibres were much atrophied. Soon after piercing the nerve sheath, the artery, and a branch given off and running parallel with it, was plugged. The artery seemed diminished in size. The intima forming the margins of its canal on section, appeared thrown into folds (undulating). In the interior was a yellowish, and for the most part hyaline, mass, completely filling the vessel, and split up into different parts. Though for the most part homogeneous, there were some cell-like bodies at the periphery, a few of which resembled white blood corpuscles, whilst others were larger and contained granules and nuclei. At one part there was a section of a vessel containing blood corpuscles. Sections in other parts showed small arterial branches also filled

with clot. The vein was collapsed and partly filled with clot. Sections of the disc showed atrophy and arteries filled with the yellowish hyaline thrombus. In the meshes of the connective tissue forming the optic nerve sheath near the sclerotic were some psammomata. Considerable changes were found in the central parts of the retina and choroid; whilst the peripheral changes were slight.

The author remarks that the ophthalmoscopic appearances in this case resembled those met with in other cases recorded and alluded to, more especially the haziness noticed between the disc and macula within twenty hours. The microscopic examination unfortunately threw no light on the cause of the red spot or streak in the neighbourhood of the yellow spot. To judge by its shape and situation, he should incline to the opinion that it was an extravasation rather than the effect simply of contrast. It was situated at the margin, not in the centre, of the macula. As early as the second day, it had disappeared, owing to increasing opacity of the retina; it was probably situated in the deeper layers of the retina or in the choroid. The case is peculiar, however, in the probable association of ciliary embolisms (as shown by irido-choroiditis), with embolism of the arteria centralis. He argues that the mass found in the arteria centralis was chiefly an embolus, but that this did not wholly fill the vessel; and at one part of the section there was evidently a vascular thrombus which had developed out of a blood-clot, and completed the plugging. There was also a distinctly circumscribed embolus in a small retinal artery. The author discusses the question of the establishment of the collateral circulation in different cases. The presence of the vessel he mentions as running parallel to the course of the arteria centralis retinae, its relation to the embolus in the central artery, or its independent plugging (as in the present case), have an important bearing on the collateral circulation. As this lateral branch is often found, it is fair to suppose that, in cases where the collateral circulation becomes quickly established, the embolus is situated beyond the origin of this branch, which is therefore available to carry on the circulation.—(Graefe's "Archiv." xxiii, pp. 287—307, with plate.)

EMBOLISM OF THE ARTERIA CENTRALIS RETINÆ, OR HÆMORRHAGE WITHIN THE OPTIC NERVE.

DR. ZEHENDER records a case which presented some of the typical symptoms generally referred to embolism of the arteria centralis retinae. A patient with heart disease was seized with sudden blindness of the right eye. Ophthalmoscopically were the signs so well depicted by Liebreich in his Atlas. There was one symptom present, however, which, in Dr. Zehender's opinion,

completely set aside the diagnosis of embolism of the central artery; *there was well marked venous pulsation*. About twelve days from the commencement, two small extravasations appeared, and soon vanished again. The venous pulse gradually disappeared. When last seen, the signs were exactly those of past embolism.—("Zehend. Klin. Monat.," xii, Aug., Sep., p. 310.)

In the same number, p. 314, is an abstract of an inaugural dissertation by Heinrich Meyhöfer, on embolism of the *arteria centralis retinae*. He narrates a case of sudden blindness of the right eye in which an early ophthalmoscopic examination revealed small arteries, interrupted blood currents and *venous pulsation*. The latter vanished away within a fortnight. The heart was diseased.

At p. 319 is an abstract of a treatise (illustrated) by Dr. Hugo Magnus, on hæmorrhage into the optic nerve ("Die Sehnervenblutungen mit zwei nach der Natur entworfenen Abbildungen," Leipzig, 1874). The author deals with the literature of the subject of extravasation into the optic nerve or within its sheath, and says the symptoms are so like those of embolism of the *arteria centralis*, that it is very difficult to draw the distinction. One most important point of distinction is the early appearance of a grayish-white retinal haze around the macula. This indicates some affection of the nerve trunk. In embolism, this gray patch would appear much later, and is accompanied by a peculiar red spot at the macula; the arteries and the veins must be quite empty. If the artery is merely plugged, the venous blood can easily escape; if the artery is ruptured, and extravasation of blood has occurred, not only is the entrance of blood interfered with, but also the outflow is obstructed, and the venous trunks will be over full. Another symptom of distinction would be furnished if the peripheral portion of the field remains sensitive. This would contraindicate embolism. The author has carried out numerous experiments on animals to elucidate the subject. By the injection of small quantities of blood into the nerve trunk, he could produce transitory changes. He was tempted to explain many cases of transitory amblyopia and amaurosis by slight extravasations into the optic nerve. By larger injections, marked changes in the circulation were produced. In six hours retinal haze appeared. This generally was situated in the innermost layers of the retina. The macula had the appearance of a dark red spot.

REMARKS ON EMBOLISM.

LORING records five cases, agreeing in general symptoms and course with cases ordinarily diagnosed as embolism. They are published chiefly because, in their further development, pheno-

mena occurred which, in the author's judgment, threw some doubt on the correctness of the original diagnosis, a doubt which he is inclined to think may also be allowed to include some similar cases observed by others. The paper is illustrated by five wood-cuts of the ophthalmoscopic appearances.

Case I is considered by the author to fit better with the occurrence of thrombosis than of embolism. The eye was excised and no plug found in the *arteria centralis*, but there were thrombi in some choroidal veins.

In *Case II*, the patient had experienced very numerous sudden temporary losses of sight in one eye during twenty-five years; and finally a similar attack occurred which was permanent and accompanied by extreme œdema and milkiness of retina, followed by slow shrinking of the vessels. He inclines to explain the case by an unsound condition of the retinal vessels in conjunction with disturbances of circulation due to heart disease.

Case III reads like embolism, but the author inclines to the hypothesis of stasis from other causes. He describes and figures a vessel of some size as running "through the red spot at the macula."

Case IV is an unusual one, in which a relapse occurred, followed by some improvement.

Case V is also quite unusual, both as to the degree of recovery which took place, and in the occurrence of a relapse.

The comments on the cases are well worth careful study.—("Amer. Jour. Med. Sci.," April, 1874, pp. 313—328.)

EMBOLISM OF THE CENTRAL ARTERY OF THE RETINA OR ITS BRANCHES.

DR. LANDESBERG records four cases—two of the central artery; one of the lower branch in the right eye, the left being blind from old embolic disease; and one of a small branch with hæmorrhage in the retina.—("Archives of Ophth. and Otol.," vol. iv, No. 1.)

A CASE OF HÆMORRHAGE WITHIN THE OPTIC NERVE.

DR. LEOPOLD WEISS records the following: A man, æt. 54, came under Professor Nagel's care twelve days after sudden loss of sight in the right eye. He noticed a cloud before the eye while sitting in a chair and looking at the sky. The cloud in a few hours (six) became almost complete darkness. When examined, he could still recognize movements of the hand quite close to the eye. Ophthalmoscopic examination showed opacities in the vitreous; the disc obscured, with a large extravasation in its centre; numerous extravasations in various parts of the

fundus. The central veins very small near the disc, much larger at a distance; two bright red arteries, the one going upwards, and its branches were mere white lines. There were numerous hæmorrhages in the yellow spot region, but no special haze could be detected. There was no cardiac mischief. The arteries were rigid, and there was the history that he had often suffered from bleeding at the nose.

The author summarises to the effect that as the patient was old and had suffered in youth from cerebral congestion and frequent bleedings at the nose; as his arteries were rigid and the heart suspected, it was probable that a hæmorrhage had occurred, and in the course of the right optic nerve, having such a position as to affect the fibres passing to the centre of the retina, and gradually enlarging; ultimately those going to the periphery, the clot having attained a certain size, would of course compress the central vessels. The thin-walled veins would be more easily compressed than the arteries, and for a time there would be distension of the distal veins giving rise to the hæmorrhages scattered over the retina, possibly also to the extravasation on the disc, though this may have been connected with a larger one in the nerve. Finally, the compression would become so great as to prevent entrance of arterial blood. This would account for the ophthalmoscopic appearances. The white appearance of the arteries would be produced by a change in the vascular wall, probably a perivasculitis.

The one difficulty consists in the localisation of the clot so as to compress the fibres going to the centre of the retina. Where are these situated in the trunk of the nerve? Liebreich considers they are on the outside. Magnus holds the contrary. Leber, on anatomical grounds, supports the former view. Schön holds that central scotoma depends on compression of the retinal vessels, and consequent imperfect supply of blood to the yellow spot. When the collateral circulation by the short posterior ciliary arteries becomes established, this may be the first part to show effusion. Berlin's experiments show the importance of the retinal vessels in reference to symptoms evinced by the yellow spot region.

The author's reason for thinking that, in this case, the retinal vessels had little to do with the loss of sight, and that certain nerve fibres were compressed, was, that his patient could still see for six hours in the peripheral portion of the field, whilst the centre was wholly obscured. This supposition, however, does not by any means exclude the idea that a disturbance of the circulation also occurred. The author is unable to decide the locality of the extravasation, because the course of the nerve fibres is not yet decided. Michel has just published the observation, that the fibres going to the region of the macula may have a peculiar arrangement, viz., that fibres go to the outer side of

the yellow spot, not only from the outer, but also from the inner half of the disc. His observations only refer to the disc and retina; but as the fibres in the nerve trunk are generally supposed to have a straight course, what applies to the disc will also apply to the nerve trunk.—(“Zehend. Klin. Monat.,” xiii, April, pp. 114—123.)

HEMIOPIA IN CEREBRAL AFFECTIONS.

DR. HERMANN COHN details five cases, giving very careful diagrams of the field of vision. In all, the line of demarcation was not a straight line, but decidedly irregular; it did not pass through the “blind spot;” there were always considerable peripheral defects in the half of the field which was not affected. This has been noticed in other cases. In four of the cases the hemiopia was left-sided, and followed apoplectic attacks. He gives a diagram, showing the position of a clot which would cause the hemiopia on Müller’s scheme of the decussation, but not accounting for the peripheral defect in the right half of the field opposite that in the left. To account for this, one would have to suppose a second clot affecting the *left* optic tract. The rare cases of *nasal* hemiopia are also inexplicable on Müller’s hypothesis. He prefers Mandelstamm’s hypothesis (Graefe’s “Archiv.,” 1873, Bd. xix, Abth. 2), based on the total crossing of the fibres, first demonstrated by Biesiadecki. Pressure on one side of the chiasma would thus account for the hemiopia and for the peripheral defect of the other half of the retina, the pressure would only have to be a little greater. Michel has made some experiments, based on a discovery of Biesiadecki, showing that pressure may be exercised on the chiasma owing to distension of the third or lateral ventricles. In the fifth case, the hemiopia followed injury, and passed off in about six months; but differently in the two eyes. The theory of a semi-decussation will scarcely answer for this case; whereas Mandelstamm’s will answer as in the other cases. The total crossing will also explain the cases of “nasal” hemiopia, but still leaves some points doubtful. Some authors have recorded cases in which the fibres did not cross at all.—(“Zehend. Klin. Monat.,” xii, Juni, Juli, pp. 203—228.)

Michel (on the structure of the optic commissure, Graefe’s “Archiv.,” Bd. xix, Abth. 2, pp. 59—84), confirms Biesiadecki’s observations as to the total crossing of the fibres of each tract. He has examined the commissure in fishes, amphibia, birds, and mammalia. Much the same arrangement exists in man as in the lower mammalia. He has never found the fibres of one optic nerve bending round to the tract of its own side. They all cross to the opposite tract. The commissure in man is made up of the fibres of both nerves arranged into a kind of basket-

work, whose meshes form more or less irregular squares. He has devoted attention chiefly to the upper surface of the commissure, and its relation to a layer of gray matter over it containing a recessus or cavity communicating with the third ventricle in the middle line and the lateral ventricles at the sides in such a way that fluid injected into one lateral ventricle would distend this cavity, and so press on the commissure, in a different manner to what occurs when the third ventricle is distended. The communication of this recessus with the lateral ventricles is of great importance pathologically, as in this way the front lateral or posterior parts of the commissure may be pressed on. If no coarse changes have occurred in the nerve fibres, recovery from amblyopic or hemiopic symptoms may follow. In answer to the objection that hemiopia is often observed in association with one-sided paralysis from apoplexy, whilst, if the nerve fibres wholly cross, one would expect blindness of the eye on the same side as the paralysis, the author appeals to the uncertainty of our knowledge in regard to the origin of the fibres going from the brain to the tract, and thinks it possible to give satisfactory explanation.—(*"Zehend. Klin. Monat.,"* xii, Jan. p. 32.)

Dr. Mandelstamm writes on hemiopia (*"Zehend. Klin. Monat.,"* xiii, Jan., Feb., März, pp. 94—100). He defends the views advocated by him in Graefe's *"Archiv.,"* 1873, Bd. xix, Abth. 2, p. 39, which agree with those of Michel. He considers that the whole of the fibres cross to the other side. As to the bearing of his researches clinically, he sums up that: 1. Disease in front of the commissure (in the middle line) will affect the inner halves of the retinae, producing hemiopia, with blindness of the temporal half of each field. 2. Disease (in the middle line) behind the commissure will affect the inner half of each field, a form of hemiopia which has been met with and recorded, but was inexplicable on the former hypothesis. 3. Disease influencing either outer angle of the commissure, if involving the nerve leaving the chiasma as well as the fibres from the tract entering it, will produce mono-lateral hemiopia, similar to that produced on the former hypothesis by disease affecting the optic tract. 4. Disease involving the "tract" on one side will produce total blindness on the opposite side.—(*"Zehend. Klin. Monat.,"* xii, Jan. p. 35.)

Dr. Schön replies to Dr. Mandelstamm in the number for Mai, Juni, 1875, p. 230. In the ordinary cases of lateral hemiopia, the defect is precisely the same in each field. This is easily accounted for on the theory of semi-decussation, whereas it is difficult to see why an extravasation should press equally on the optic tract and nerve trunk. The absence of optic neuritis in the ordinary cases of hemiopia, also, in his opinion, militates against any affection close to the commissure. The cases of temporary hemiopia seem difficult to explain on Mandelstamm's hypothesis. In his

opinion, there must be semi-decussation somewhere, if not in the commissure. Probably there is some centre in the cerebrum for co-ordinating the impressions derived from identical halves of the retinae.

MODE OF DISTRIBUTION OF THE OPTIC NERVE-FIBRES IN THE
HUMAN RETINA.

MICHEL ("Beiträge zur Anat. u. Phys.," Leipzig, 1875), after noticing previous observations recorded, states that he has found that the nerve-fibres on the disc are laid more thickly over one another on the nasal side and thinnest on the temporal side, and that, in the former position, they are grouped in broad bundles, in the latter (towards the yellow spot) only in very small bundles, and often have very small intervals between them. Their course here is straight, whereas, in all other parts, the bundles have a curved direction. It is especially noteworthy that the bundles in the immediate vicinity of the disc are still somewhat closely arranged together and in thick layers, whilst, in other parts of the retina, with the exception of one spot, they occur singly. Directly after leaving the disc, the bundles of fibres going to the yellow spot have slit-like spaces between them, and anastomose at acute angles; the further above and below, the broader and thicker are the curved bundles, and the spaces between them become greater. The bundles going directly to the macula are lost in the layer of ganglion cells; those at a little distance surround the macula and anastomose so completely that the transition cannot be made out; those still further become less and less curved, and, at last, instead of anastomosing, curve in the opposite direction. Above the space between the yellow spot and disc is the only part where the bundles are placed over one another; the one layer giving off thin bundles to the other. The number of bundles crossing over one another here, at this single spot, varies from 8 to 10. The mode of distribution of the fibres in the retina resembles that of a plexus. Towards the periphery, the thickness of the bundles diminishes, and the shape of the intervening spaces changes, becoming less slit-like and more quadrangular. At the ora serrata, the fibres generally terminate by free ends. On the disc, the vessels lie between the nerve bundles, and run parallel with them, occasionally, however, the fibres running in the direction of the macula course over the central artery or its branches. The author thinks this affords an explanation of the muscae complained of. As a rule, the larger vessels follow the course of the nerve bundles, and generally are more or less definitely included in such a bundle.—("Zehend. Klin. Monat.," xiii, April, p. 140.)

ON THE DECUSSATION OF THE NERVE FIBRES IN THE OPTIC COMMISSURE.

PROF. GUDDEN describes and figures a series of preparations showing that (1) the so-called ganglion opticum basale is not a ganglion opticum. (2) In all animals whose visual fields are quite separate, the optic nerves cross completely. (3) In all animals (including man) whose fields correspond, the fibres cross partially. (4) No anterior commissure of the chiasma can be demonstrated. (5) The posterior commissure exists, but has no physiological relation to the nerves, and, on the contrary, is rather wholly independent of them.—(Graefe's "Arch.," Bd. xx, Abth. ii, p. 249—268.)

THE FIELD OF VISION AND ITS ANOMALIES.

IN "Zehend. Klin. Monat." Aug., Sept., p. 321, is an abstract of a treatise by Dr. Wilh. Schoen (Die Lehre vom Gesichtsfelde und seinen Anomalien. Eine physiologisch-klinische Studie. 150 pp. 12 lith. Tafeln, 17 Holzschnitte.) He discusses the extent of the field in its normal and abnormal conditions. In considering the extent of the field in disease, the delicacy of perception of colours must be gauged. In progressive atrophy and atrophy after neuritis, at the commencement, the area of perception of colours diminishes from the periphery. The perception of green is limited first, then lost; then red and yellow; last of all, blue. Inability to perceive a colour and limitation of the fields of different colours are bad signs. According to Schoen, atrophy does not affect any special colour, but the sensitiveness for colour fails, step by step, with the extent of field, since the excitability of all the fibres is equally diminished. Green requires the highest excitability of the fibres. The action of *santonin*, he considers, is to increase the sensitiveness of all the fibres equally. He has used it successfully in two cases, with this view. The author has recorded examinations of the field of vision and perception in colour, in transitory amblyopia, from various causes—glaucoma, neuritis, retinitis, retinitis pigmentosa, anæsthesia, &c., retinæ detachment, choroiditis, scotomata, &c. The histories of some 80 cases are given, and 37 charts of fields. See, also, a paper by him in "Zehend. Klin. Monat.," 1873, p. 171.

On Perception of Colours.

DR. M. WOINOW.—(Graefe's "Arch., Bd. xxi, Abth. 1, p. 223—50.)

On the Perception of Colours in Indirect Vision.

DR. FERD. KLUG.—(Graefe's "Arch.," Bd. xxi, Abth. 1, p. 251—294.)

The Perception of Colours at the Periphery of the Retina.

DR. EDM. LANDOLT publishes an account of observations of his, showing that colours are recognised at the periphery of the retina, if they be sufficiently intense.—(*"Annales d'Oculistique,"* Jan., Fev., 1874, p. 44.)

The Determination of One of the Three Fundamental Colours of the Normal Eye.

DR. H. SCHÖLER.—(Graefe's *"Arch.,"* Bd. xx, Abth. ii, p. 87.)

The Influence of Fatigue on the Sensitiveness for Colours.

DR. W. SCHÖN.—Graefe's *"Arch.,"* Bd. xx, Abth. ii, p. 273.)

The Opposition between the Two Fields of Vision.

DR. SCHÖN and DR. MOSSO. We are in the habit of looking, at short intervals, first at one field and then at the other. If one eye be shut, the portion of the other field common to the two eyes will be found to become darkened every now and then, and the colour of this dark portion may be altered by allowing a little light to enter the covered eye. We may say that an observer regards the field of the uncovered eye seven-tenths of the time of the experiment, and three-tenths that of the eye which is covered.—(Graefe's *"Arch.,"* Bd. xx, Abth. ii, p. 269—272.)

SCLEROTOMY.

THIS operation is recommended by Dr. Wecker, in cases of absolute glaucoma, in which the presence of severe pain would otherwise lead the operator to perform excision of the globe. In the case of a woman who had suffered pain in a lost glaucomatous eye for four years, sclerotomy was followed by complete cessation of the pain and diminution of tension. Where any vision remains, and the iris is well preserved, iridectomy should be performed.—(*"Annales d'Oculistique,"* Mars—Avril, 1874, p. 120.)

GLAUCOMA.

DR. J. HIRSCHBERG contributes a case in which a single instillation of atropine into the eyes caused double acute glaucoma in an apparently healthy lady, aged 64. Also a case of *glaucoma malignum* (Graefe, see vol. vii of this Journal, p. 100.)—(*"Archives of Ophth. and Otol.,"* vol. iv, No. 2.)

DOUBLE CHRONIC GLAUCOMA IN TWO BROTHERS, AGED 19 AND 20 RESPECTIVELY.

THE cases are recorded by Dr. Pflüger, in *"Zehend. Klin. Monat."* xiii, April, p. 111.

SOME SUBJECTIVE SYMPTOMS IN CASES OF INCREASED INTRA-OCULAR PRESSURE.

DR. M. REICH, in a paper on certain subjective symptoms of increased intra-ocular pressure, treats (I) of *entoptic pulsation*. When he fixes his eye on the clear sky, or a white wall, or a sheet of white paper, and exercises pressure on his eyeball with a blunt object, he sees (1) a dark round spot close to the outer side of the point of fixation, and (2) on the inner side of the fixation point, and close to it, a grayish patch with stripes. In this patch he clearly detects phenomena attributable to pulsation. The patch appears and disappears synchronously with the radial pulse. The patch increases in size after a few seconds, and, if the pressure be properly regulated, pulsation will be seen to occur at the point of fixation. The various shapes and appearances the patch takes, according to the pressure used, are described, and the different colours seen, according to the colour of the surrounding light. He alludes to the observations of Purkinje and others. He thinks he has shown conclusively that the phenomena are due to pulsations of the ciliary arteries, and not of the central vessels. (II) *Perception of colours under the influence of increased intra-ocular pressure*. He finds that green fails to be perceived before red, and blue last. The various transitions through which each colour passes are given. He appends some observations on the normal perception of colours in the peripheral portions of the field. Red, blue, green, and yellow were recognised at the outer portion of the field, for a distance of from 73° — 85° . Red was recognisable still further; light further still. The perception of colour did not extend anything like so far from the centre on the inner half of the field, but further than has been recorded by other observers. The temporal portion of the retina was shown to have a certain degree of inability to recognise red.—("Zehend. Klin. Monat.," xii, Juni, Juli, p. 238—255.)

DISEASE OF THE VITREOUS FOLLOWING ON GENERAL ARTERITIS—THROMBOSIS OF THE BASILAR ARTERY—DEATH.

DR. FR. POU CET records the case of a man, aged 45. The vitreous in each eye was so opaque that the fundus could not be seen. One eye was quite blind, the other had perception of light. There were no floating masses. There was no history of syphilis obtained. The first and only symptom in the case, was opacity of the vitreous. Iodide of potassium gave no relief, nor iridectomy. Three months later he was seized with vertigo and fell, and afterwards had left hemiplegia. He recovered consciousness. Four days later he had a second attack, which proved fatal. At the *post mortem*, a firm plug was found occupying the

whole length of the basilar artery. The aorta and the cerebral arteries were atheromatous. A detailed account of the microscopic examination of the basilar artery and the eyes is given, with six woodcuts. The retina was much altered. There was evidence of arteritis and much pigmentary change. The epithelium of the choroid was altered, and the arteries in the deeper layers showed evidences of inflammation. In some places, there were no vessels, only fibrous tissue. A careful examination was made of the cicatrices of the iridectomies, and the author calls particular attention to the conditions found, as possibly throwing light on the efficacy of iridectomy in glaucoma. The new tissue would allow of filtration better, &c. The author discusses the bearings of this case on retinitis pigmentosa and choroido-retinitis. The optic nerve was unaffected, and the disc was not atrophied; the central artery was not involved. The epithelium of the choroid had undergone colloid degeneration, and the pigment had left the cells and penetrated, by degrees, into the retina. He thought the commencement was a chronic inflammation of the arteries generally, which, attacking the basilar artery, caused the death of the patient, and, in the retina and choroid, caused gradual failure of sight, loss of pigment from the choroid, and subsequently the passage of pigment granules into the vitreous and opacity of it. The failure of sight probably extended over five or six years.—(*Annales d'Oculistique*," Mars, Avril, 1875.)

A CASE OF RETRO-OCULAR ANEURISM, WITH EXTREME EXOPHTHALMOS
—LIGATURE OF THE COMMON CAROTID.

DR. NIEDEN records the case of a man, *æt.* 19, who received a severe injury to the head, and on the next day noticed a loud singing noise on the left side of his head, and which subsequently increased. The left eye became prominent and blood-shot. Five months after the accident he came under care. The exophthalmos was the most striking symptom. He could still see with the eye, and there were no special changes ophthalmoscopically. Pressure on the globe excited visible pulsations; the noise heard by the patient was altered in character, and the hand was conscious of a purring sensation. A loud intermittent bruit could be heard. Pressure on the carotid stopped the pulsations but not the bruit. The author discusses the probable causes of these symptoms, and decides in favour of a retro-ocular diffused aneurism. Compression of the carotid was tried for ten weeks without any good result. The left carotid was then tied on Lister's plan of antiseptic dressing for the wound. Pulsation ceased, and the bruit was scarcely perceptible. The wound healed by first intention. The prominence of the eyeball gradually diminished. The bruit somewhat increased. After

some time it was evident that the left superior thyroid was much enlarged; when it was compressed, the bruit ceased. The state of the patient when seen after a considerable interval had elapsed was very favourable. Dr. Nieden reviews the statistics of ligature of the carotid for pulsating orbital tumours. He manages to quote the results of 113 cases. In 79 (or 69·9 per cent.) a cure resulted; in 14 (or 12·3 per cent.) the condition was unaltered; in 7 (or 6·3 per cent.) improvement followed; and in 13 (or 11·5 per cent.) a fatal result occurred.—("Zehend. Klin. Monat.," xiii, Jan., Feb., März, p. 38—55.) *Jos Jacobi in 1881*

RETINITIS PIGMENTOSA.

DR. SCHIESS-GEMUSEUS records a case in which the central vision and the extent of field improved. Diagrams of the fields are given.—("Zehend. Klin. Monat.," xiii, Mai, Juni, p. 200.)

A careful examination of eyes in which the changes, characteristic of retinitis pigmentosa were found, after removal *post-mortem*, is given by Dr. Hosch in "Zehend. Klin. Monat.," xiii, Jan., Feb., März, p. 58. The previous history was not known. The patient, a woman, while in hospital a few days before death did not complain of any defect of sight, so the eyes were never examined.

NEW GROWTH OF VESSELS AND CORKSCREW-LIKE VESSELS (WITHOUT DILATATION) IN THE RETINA.

DR. JOS. JACOBI describes and gives illustrations of three cases in which he met with small corkscrew-like, or variously tortuous vessels (veins), in the neighbourhood of the disc, and one case in which there was a real vascular new growth. They all appeared superficially placed.—("Zehend. Klin. Monat.," xii, Juni, Juli, p. 255—260.)

RUPTURE OF THE CHOROID—ANEURISM IN THE OPTIC DISC.

DR. MANNHARDT records three cases. In one of them the rupture was above and to the outside of the disc; there was pulsation in the ascending artery and descending vein, and in the outer quadrant of the disc there was a round grayish excavation as if cut out with a punch. It nearly reached the margin of the disc. In the bottom of it could be seen a slight, rounded projection. Pulsation was visible over the whole surface. This was regarded as an aneurism, probably aneurisma spurium. In the second case, the rupture was unusually extensive, reaching obliquely almost across the whole fundus. In the third case, the scotoma present did not correspond with the situation of the visible cicatrix. This was supposed to be due to the contraction having displaced

the scar, while the scotoma corresponded to the original situation of the rupture and interference with the retina.—("Zehend. Klin. Monat.," xiii, April, p. 132.)

RUPTURE OF THE CHOROID AFTER BLOWS OF THE EYE FROM BLUNT OBJECTS.

PROF. ARLT argues that the eyeball suffers greatest extension in the equatorial diameter, that the choroid is fixed in the ciliary region and at the disc, and where the vasa vorticosa leave the eye; therefore, the region most affected is limited; the rent occurs at right angles to the extension, and concentrically to the posterior pole.—("Zehend. Klin. Monat.," xii, Oct., Nov., Dec., p. 382.)

CHOROIDITIS AND ITS INFLUENCE ON VISION.

DR. OTTO BERGMEISTER, in a paper in Graefe's "Archiv.," Bd. xx, Abth. ii, p. 95—122, passes in review the different methods of grouping cases of choroiditis adopted by different authors, and their views as to prognosis. It is the general opinion that the ophthalmoscopic appearances afford very little guide as to prognosis. The author, from his extensive experience in Prof. Arlt's "Clinic," has arrived, he believes, at certain conclusions, which may be of some value in reference to prognosis. He quotes Schweigger to the effect that the ophthalmoscopic appearances and the diagnosis depend in great measure on the condition of the pigment layer. He describes the changes met with in recent choroiditis without exudation under the term *choroiditis disseminata simplex*. In these cases we commonly meet with local defects of the field of vision, but great general defect of vision may rapidly set in owing to the changes affecting the neighbourhood of the disc, or their spreading forwards to the ciliary region. Good vision exists only when the changes are limited to a zone between the equator and the posterior pole of the eye. If changes make their appearance near the disc we find one of two series of ophthalmoscopic changes; first, congestion of the disc, either in the form of a deeper colouring shown through a lightish gray cloudiness of the tissue of the well-defined disc, or in the form of a grayish-red streaking of the disc with haze of its margins. This participation of the disc is produced by the share taken by the peri-neural wreath of vessels in the circulation in it. The quicker the hyperæmia disappears, the more rapidly will the vision improve; the longer it lasts, the more doubtful is the prognosis, because atrophy will gradually result entailing permanent loss of vision. Secondly, we find opacities in the posterior part of the vitreous, perhaps coming into view in front of the disc. In many cases the vitreous remains perfectly clear,

and the author thinks one chief reason for its becoming affected, at any rate in the posterior part, depends on the locality of the disc being affected with co-existent disturbance in the circulation in the region of the perineural wreath of vessels. In another series of cases fresh patches of choroiditis make their appearance more peripherally, and thus encroach on the ciliary region. As results, we have opacity of the anterior part of the vitreous, chiefly in the form of very small points best seen by feeble illumination. Dots are also found at the posterior part of the lens. The disease may extend to the iris, leading to deposits on Descemet's membrane, synechiæ and exudation into the pupil. This occurs more especially in connexion with syphilis. In contradistinction to the simple disseminate choroiditis we have *choroiditis circumscripta exsudativa*, with scotomata, chromatopsia, metamorphopsia, sensation of pressure on the eye, and pain felt on pressure. *Choroiditis disseminata exsudativa* occurs in the form of one (or more) extensively diffused patch (diffuse exudative syphilitic choroido-retinitis). Such a patch may appear in the course of another form of choroiditis, or the disease may commence as such. The prognosis is very doubtful. A fourth form of choroiditis spreads from the periphery in small distinct patches towards the centre, and is associated with pigmentation of the retina, and a progressive diminution of field, with preservation of central vision. Finally, atrophy of the disc dependent on progressive atrophy of the nerve fibres of the retina is observed. Inability to see in a dull light is a not unfrequent symptom. The author sums up as follows:—1. The atrophic form of choroiditis usually met with may run its course without great defect of sight so long as the ophthalmoscope reveals changes confined to a zone between the æquator and the posterior pole. The prognosis depends chiefly on the way in which the disease spreads, that is, where fresh patches make their appearance. When they encroach on the neighbourhood of the disc, vision is affected by the disturbances set up in the circulation in the optic nerve and by opacities in the posterior part of the vitreous. If the disease spreads forwards, vision is then interfered with by anterior vitreous opacities. 2. Circumscribed exudations lying on the surface of the choroid produce local scotomata, photopsia, chromopsia, and metamorphopsia. The degree of the defect of vision essentially depends on the part affected; for instance, the yellow spot. 3. Vision will be most severely affected when changes in the outer retinal layers are added to persistent changes in the choroid, or where the whole uveal tract is affected. Atrophy of the optic nerve follows. If exudation persists at the posterior pole, central vision is destroyed. 4. Pigmentation of the retina, in consequence of choroidal atrophy progressing from the æquator to the posterior pole of the eye, causes diminution of field and hemeralopia; whilst

central vision may remain, even though the nerve may show signs of atrophy at an early period.—(Graefe's "Archiv.," Bd. xx, Abth. ii, p. 95—122.)

ANEURISMA ARTERIOSO-VENOSUM RETINALE.

DR. HUGO MAGNUS describes and figures a remarkable condition of the retinal vessels following an injury. The central vessels were enormously enlarged; the arteries and veins of very similar colour, &c., and communicating with one another. That is, the principal venous and arterial trunk passing upwards could be seen to communicate, and also the two passing downwards. This intercommunication would account for the similarity between the arterial and venous trunks.—(Virchow's "Archiv.," Bd. 60, p. 38, 1874, and (with fig.) "Zehend. Klin. Monat.," xii, Juni, Juli, p. 265.)

STATISTICS OF OPTIC NEURITIS IN INTRA-CRANIAL TUMOURS.

DR. M. REICH has collected together the statistics of 45 cases of cerebral tumour (recorded), in which an ophthalmoscopic examination was made. In 41, there was double neuritis, or consequent atrophy; in one, single neuritis, and in 3, no changes existed. Adding the 43 cases noted by Annuske ("Archiv. f. Opth.," Bd. xix, Abth. 3), he finds, that of 88 cases, in 82 there was double neuritis; in 2 single neuritis (the tumour being situated on the opposite side); and in 4, there were no ophthalmoscopic signs.—("Zehender's Klin. Monat.," xii, Juni, Juli, p. 274.) Annuske says, that experience, hitherto, shows that in the majority of cases of "intra-ocular neuritis" there is *no defect of sight*, at any rate at the commencement, and he sums up to the effect that "optic neuritis is an almost invariably constant symptom in connection with cerebral tumours."

COMPLETE TRANSITORY AMAUROSIS AFTER INSTILLATION OF ATROPINE AND CALABAR BEAN.

THE patient was a child 10 years of age. Atropine having caused dilatation of the pupils to the great alarm of the parents, a calabarised gelatine disc was inserted. The friends were soon tranquillised, and took the child away. Some hours later they returned, saying the child had become quite blind. He could not distinguish light from darkness. The ocular muscles were not affected. The patient complained of pain in the head, and was drowsy. The next day vision was partially restored, but was again lost. The cure was not complete till the end of six days.—(Carreras Arago, "Cron. Oftalm.," 1874; "Annales d'Oculistique," Mars, Avril, 1875, p. 185.)

PUNCTURE IN DETACHMENT OF THE RETINA.

DR. WECKER records a case in which a considerable portion of the retina was detached in each eye, and in which good vision was restored by puncture in each eye (at different times). The retina, though detached, had not lost its transparency. The patient was myopic. Mercurial inunction was practised at the same time, and iodide of potassium given internally; but this treatment had no effect on the eye not operated on.—("Annales d'Oculistique," Mars, Avril, 1874, p. 124.) In the number for Mars, Avril, 1875, another case is noted. The detachment was more advanced, and the result negative.

GLIOMA.

A CASE of glioma of the retina with numerous subperiosteal metastatic tumours is recorded by Dr. Charles S. Turnbull and Dr. H. Knapp. The microscopic examination of the growth was made by the latter. The patient was a girl aged 3. The metastatic tumours differed from those on record by the peculiar and novel feature that they did not originate in the diploë, but between the periosteum and the surface of the bone. A remarkable observation furnished by this case was that in some places intra-cranial tumours corresponded to extra-cranial ones, *e.g.*, in the two temporal fossæ, which, at first sight, gave the idea of their originating from the diploë. This idea Dr. Knapp was obliged to discard, as not only the diploë, but even both tables of the cranium which separated two smaller tumours, were found to be but little changed.

A second case, in a girl twelve months old, is also recorded by Dr. J. Thompson and Dr. H. Knapp. There was a family predisposition to glioma. A brother to the patient and a cousin on the father's side were said to have suffered in a similar way, and the father's aunt also lost two children exactly in the same manner. The disease obviously originated in the inner granular layer.—("Arch. of Ophth. and Otol.," vol. iv, No. 1.) In No. 2, two other cases of glioma are given by Dr. Williams and Dr. H. Knapp, p. 241.

SARCOMA OF THE CHOROID.

DR. E. WILLIAMS AND DR. H. KNAPP record a case of *sarcoma of the choroid with infection of the retina and dissemination of germs from the degenerated retina upon healthy portions of the choroid*. Also, a case of *melano-sarcoma of the choroid extending to the retina and optic nerve*. The subject of the latter case was young for pigmented sarcoma.—("Arch. of Ophth. and Otol.," vol. iv, No. 1.)

SUDDEN AMAUROSIS AFTER LOSS OF BLOOD.

J. SAMELSOHN contributes a second paper on this subject, the first being in Bd. xviii, Abth. ii, p. 225. Amaurosis following on loss of blood from the intestinal tract depends on various causes. When it follows severe hæmorrhage it may be due to a purely mechanical cause (peripheral) dependent on the relation between the blood- and lymph-pressure and distension of Schwalbe's intervaginal space. When it follows slight loss of blood, the cause must be central and produces both the loss of blood and the amaurosis. The activity of the pupil in this group of cases is a symptom of hopeful significance as regards prognosis. —(Graefe's Arch.,” Bd. xxi, Abth. i, p. 150—178.)

AMAUROSIS IN PUERPERAL WOMEN.

DR. F. WEBER (“Berl. Klin. Woch.,” 1873, Nos. 23 and 24) records four cases of amaurosis in puerperal women. In two of the cases, convulsions preceded the amaurosis; in a third, the amaurosis was followed by convulsions, and in the fourth no convulsions occurred, but there was some spasmodic condition of the uterus. The three who had convulsions had albuminuria and other symptoms of kidney mischief, which disappeared shortly after delivery. The amaurosis either came on suddenly or was first noticed after coma. The pupils were dilated and pain in the eyes complained of. No ophthalmoscopic examination was made. Vision was restored after an interval varying from six days to some weeks. Only one of the patients was a primipara; the others having had several children. Convulsions are far commoner in primiparæ. In the three cases in which uræmia existed, there did not seem to be any direct connection between the severity or duration of the uræmia and the amaurosis.—(“Annales d'Oculistique,” Sept., Oct., 1874, p. 176.)

NEURO-RETINITIS RESULTING FROM A GUMMOUS TUMOUR OF THE DURA-MATER.

DR. H. KNAPP says that retinitis in syphilitic persons has mostly no peculiar features, two conditions, however, may be mentioned as generally being of syphilitic origin. 1st. Irregular white stripes radiating from the disc in the course of the blood-vessels, sometimes flat, sometimes considerably raised; 2nd. Small, roundish, white patches of fatty appearance, dispersed in some cases over the whole retina; in others limited to certain places, in which they are so densely crowded as to resemble a piece of mosaic work. In the region of the yellow spot, he has seen striking pictures of this second condition, which is totally different from the well-known radiating figures so frequently

witnessed in this region in cases of Bright's disease and neuro-retinitis, the consequence of morbid processes in the orbital or cranial cavities. He narrates the case of a married woman, aged 32, who came under his care a fortnight before death with signs of ordinary neuro-retinitis passing into atrophy of the optic nerves. There was a distinct history of syphilis. Death occurred unexpectedly after epilepiform seizures. At the anterior portion of the anterior lobe of the left hemisphere was a large gummous tumour of the dura-mater extending into the brain substance (a sketch is given). The central portion of the tumour was yellowish-white, opaque and hardish, like fibro-cartilage, whereas the peripheral portion (next the brain substance, the pia-mater intervening) was transparent, hyaline, and softer than the central portion, which it lined to a nearly uniform thickness of $\cdot 12$ inches. The microscope revealed an accumulation of small cells embedded in a moderate quantity of homogeneous basis-substance. The majority of the cells were round and contained large nuclei. There was a moderate amount of fat granules. The hard portion had much the same structure, but, in addition, a considerable quantity of spindle-shaped cells. Here and there was a network of anastomosing stellate cells.—("Arch. of Ophth. and Otol., vol. iv, No. 2.)

RETINITIS APOPLECTICA ALBUMINURICA—NEURITIS ALBUMINURICA.

DR. MAGNUS records a case of numerous small apoplexies in the retina in connection with albuminuria; a case of neuritis and retinitis apoplectica albuminurica, and a case of neuritis albuminurica. In these cases the fatty changes so commonly met with were not present.—("Zehend. Klin. Monat.," xii, April, Mai, p. 171.)

THE CHIASTOMÈTRE.

UNDER this name, Dr. Landolt describes and figures an instrument for measuring the distance between the two eyes. It consists of a long box, having at one end two openings (like those of a stereoscope) for the eyes and a notch for the bridge of the nose. Exactly in the middle of the box is a partition with a vertical slit. At the opposite end are two metallic plates moveable one on the other from side to side, and each provided with a vertical slit. The person examined looks through the eye-holes, one of which (say the left) is shut. He then looks with the *right* eye through the vertical slit in the middle of the box, and the *left* plate at the other end is moved till he can see light through the slit in the middle; the *left* end slit is then in a line with the *right* eye. The process being repeated for the left eye gives its position. As the vertical slit is exactly midway

between the eyes and the end slits, the distance between these two gives the distance between the two eyes. The same result may be obtained by looking at a needle in the centre of a card with each eye separately and placing one of two needles (moving laterally at the opposite end of the card) in a direct line with the right eye and the other with the left.—("Annales d'Oculistique," Jan.—Fév., 1874, p. 46.)

CONGENITAL COLOBOMA IN THE HUMAN EYE.

J. HIRSCHBERG contributes a paper on this subject. He gives woodcuts of a coloboma retinæ et choroidis centr. circumscr. (Dictyoschisma centrale.) and coloboma inferius circumscr. He narrates two cases of diffused coloboma. In all the cases when the field was tested, it was found deficient over the area of the coloboma. He gives in all, three cases of coloboma without any affection of the iris. When the disc is involved, he has not found the great defect of sight mentioned by Manz. *Coloboma lentis*. Cases recorded are quoted and a fresh case mentioned. Prof. Becker is also quoted as having often seen such cases.—("Graefe's Arch.," Bd. xxi, Abth., i, p. 179—189).

Dr. Talko ("Zehend. Klin. Monat." xiii, Mai, Juni, p. 202—222) records two cases of *congenital coloboma palpebrarum*, with an illustration. A case of (*Sclerophthalmia*) *congenital opacity of the right cornea—congenital anomaly in the radiation of the left iris—Talipes equinus* (with illustrations). A case of *melanismus iridis partialis* (with illustration). A case of *albinismus and leucosis oculorum*. A case of *coloboma of the choroid, ciliary body and iris in the right eye*. A case of *coloboma of both irides and of the right choroid* (with illustration). A case of *coloboma of the choroid in the right eye without any affection of the iris* (illustrated).

Ophthalmoscope.

DR. H. KNAPP describes and figures a new ophthalmoscope with a single disc. The price is twenty dollars. There are twenty-three lenses. He finds the best size for the aperture is 3.50 to 3.75 mm. (.14—-.15 in.) in diameter.—("Archives of Ophth. and Otol., vol. iv, No. 1.)

Monophthalmos and Microphthalmos.

DR. JOS. JACOBI records a case of monophthalmos and also one of microphthalmos.—("Zehend. Klin. Monat.," xii, Juni, Juli, 260.)

Absence of both inferior Puncta Lacrymalia.

DR. MAGNUS records the case.—("Zehend. Klin. Monat.," xiii, Mai, Juni, p. 199.)

On the Theory and Construction of Stereoscopic Instruments for Scientific Diagnosis.

DR. BOETTCHER ("Graefe's Archiv.," Bd. xx, Abth. ii, p. 182—204.)

The Absorption of Liquids by the Cornea.

DR. KRÜKOW and Prof. Th. Leber publish a continuation of their account of their researches. They have experimented on freshly excised corneæ and on corneæ of living animals. Certain fluids are readily diffused through the cornea proper; the epithelium offers great resistance to their passage. When it is removed, absorption takes place much more readily.—("Graefe's Archiv.," Bd. xx, Abth. ii, p. 205—48.)

Hasner's Theory of "Inversion" ("Rückkonstruktion") of Retinal Images.

J. JACOBSON writes in opposition to Hasner's theory. ("Graefe's Archiv.," Bd. xx, Abth. ii, p. 71.)

Prof. Hasner replies to these observations. — Bd. xxi, Abth. i, p. 43.

Suppurative Inflammation of the Lacrymal Gland.—Abscess opened in the Conjunctival Cul-de-sac.

DR. J. GAZAT records the case. ("Annales d'Oculistique," Jan.—Fév., 1874, p. 26.)

The Dioptrics of the Eye.

THE paper of Messrs. Landolt and Nuel, of which an abstract is given, p. 88, last Periscope, is given in full in the "Annales d'Oculistique," Jan.—Fév., 1874, p. 30.

Blind—Cataract (Staar.)

A Philological Study, by Prof. J. Zacher, on the words "blind" and "Staar" will be found in Zehender's "Klin. Monat.," xii, Aug.—Sept., p. 277—302.

Corectopia Binocularis.

DR. LANDESBURG records a case ("Archiv. of Ophth. and Otol.," vol. iv, No. 1.)

On Rotation of the Eye.

DR. SCHÖN seeks to explain and amplify Helmholtz's statements in his "Physiological Optics." ("Graefe's Archiv.," Bd. xx, Abth. ii, p. 171—81, and 308—14.)

A Contribution to the Calculations of Ophthalmometry, by Dr. J. HIRSCHBERG, and *the Co-efficients of Refraction of the Fluid Media of the Human Eye*, by Dr. J. HIRSCHBERG.—("Archives of Ophth. and Otol.," vol. iv, No. 2.)

The Nerves of the Arteria Centralis Retinæ and on a Fovea Centralis in Frogs.

PROF. W. KRAUSE. ("Graefe's Archiv.," Bd. xxi, Abth. i, p. 296.)

Opaque Retinal Nerve Fibres.

DR. SCHMIDT records a case in which a microscopic examination was made. (Zehend. "Klin. Monat.," xii, April—Mai, p. 186.)

In "Graefe's Archiv.," Bd. xxi., Abth. i, are also the following papers :—

On the Histology of the Conjunctiva.

DR. M. REICH considers that the so-called flask-shaped cells are pathological products—not merely mucous cells. He treats (1) of the epithelium of the conjunctiva tarsi and cul-de-sac; (2) of the so-called flask-shaped cells (Becherzellen); (3) of the papillæ and "tubular glands;" (4) of the conjunctival tissue proper. The paper is well illustrated.

Observations on the "Empirical" Theory of Vision (p. 23—42.)

BY J. HIRSCHBERG. A detailed account is given of the way in which a child gradually learnt to see after being operated on for congenital cataract.

Parallel Rotatory Movements of the Eyes.

DR. M. E. MÜLDER. (p. 68—124.)

The Law of Relation of the position of the Retina to that of the line of Vision (p. 125.) F. C. DONDER,.

On the Movements of the Head employed in looking at objects in various positions (p. 131—149).

DR. E. RITZMANN treats first of the quantitative relation between the movements of the head and of the eyes, and secondly, of the direction of the movements of the head. We constantly move the head in association with the eyes, and these movements are in proportion to the distance of the object, and differ in different directions. The relation

between the movements of the eyes and of the head varies in different persons. On looking down, the movements of the eyes are disproportionately greater than those of the head. The movements of the head in a vertical or horizontal direction were in relation to the same axis as that of the ocular movements; in a diagonal direction, on the contrary, the axes of the two did not correspond. The degree and direction of the divergence varied for different persons.

TO CORRESPONDENTS.

WE have received, in reply to our "Suggestions, &c.," vol. vii, p. 438, some interesting notes from Dr. Swan M. Burnett, of Knoxville, Tennessee, on the relation between race and diseases of the eye in that part of the United States. Dr. Burnett considers that *arcus senilis* occurs much earlier in negroes of pure blood than in either mulattoes or whites. He does not remember ever to have seen *myopia* in a negro, though in some of them the eyes are, from the formation of the skull, decidedly prominent. *Phlyctenular ophthalmia* is more common among the mulattoes than either among the whites or pure negroes; and in this connexion Dr. Burnett observes that scrofulous diseases and rapid tuberculosis are extremely common in mulattoes; this cross is not so strong constitutionally as that between the negro and Red Indian. The most marked difference, however, is in the extreme rarity of *granular lids* among the negroes. Dr. Burnett, in a considerable ophthalmic practice during five years, among a population one-third of whom are negroes, has never yet seen a case of granular lids, or any of the results of this disease, in a negro or mulatto. He concludes that this must be due to race, for the surrounding white population, especially the Irish, suffer largely from the disease; he thinks that the exemption of the negroes is certainly not due to better hygienic conditions, for they are poorly housed, not too well fed, often overcrowded, and not very clean. Dr. Burnett states that the exemption from granular ophthalmia extends to half-caste negroes, although they are specially prone to scrofulous and tuberculous diseases. *Cystic tumours* of the lids are, Dr. Burnett states, much commoner among the negroes than among the whites; the same is true of tumours of the lobe of the external ear in the negro women, but this is due, he considers, to their habit of wearing brass earrings.

Dr. Burnett refers to some "Climatological Notes on

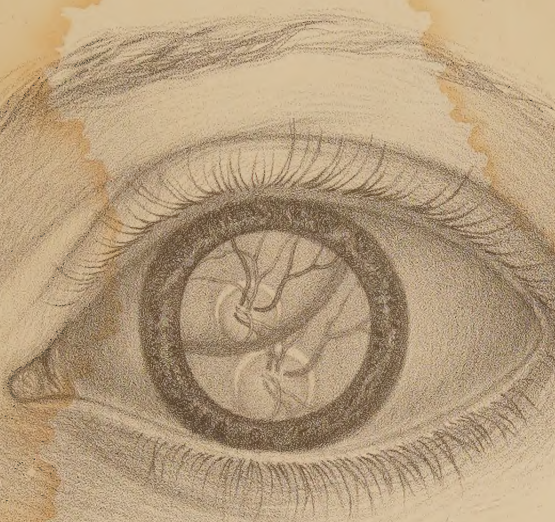
Trachoma and Glaucoma," from Costa Rica, by Schwalbe, in Zehender's Monatsblätter, August, 1866, where the author notices the same immunity of the negroes from trachoma.

Dr. H. Sattler, assistant to Professor Arlt in Vienna, sends us some observations made during a recent tour through the chief European countries. He considers that *interstitial keratitis* is much less common in France, Holland, Germany, and Austria, than in England; and that it is less frequently associated with malformed teeth than in our country. Dr. Sattler finds that *diphtheritic ophthalmia* is as rare in Austria as in England, and that when it occurs it is usually in close relation with scarlet fever; he states that in North Germany it is common. Dr. Sattler found that the relative frequency of *trachoma* varied much in different countries. *Rheumatic Keratitis* and *iritis* are not infrequent in Austria, although gout is somewhat rare. The frequency of *cysticercus* in the eye varies much in different parts of Europe.

Fig. I.



Fig. II.



J.F. Streetfield del.

Congenital Malposition of the Lens.



Fig. III.

W.R.G.

E. Burgess lith.

W. West & Co imp.

Optic Neuritis without Intra cranial Tumour.

